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"WE have doubled and redoubled our vast production, increasing month by month our material supply of tools of war for ourselves and Britain and China—and eventually for all the democracies. The supply of these tools will not fail—it will increase."

—President Roosevelt
May 27, 1941

THE FOUNDRY

EDITORIAL

Controls Increase Problems Of Producing Castings

AS THE United States moves nearer to war, control of all commercial and industrial activity centers more firmly with the government in Washington. The president's declaration of an unlimited emergency, which increases greatly his authority over the military forces, industry, transportation and communication, also has served to dramatize the startling changes which have taken place in moving from a peace to a war economy. Shortly after declaring the unlimited emergency, the president signed the mandatory priorities measure giving OPM full power to impose priorities on all material purchased by the government under Navy, Army or lend-lease contracts and providing complete authority to subordinate civilian needs. This was followed by the introduction of a bill in the Congress which would permit the president to seize property of any kind or character directly or indirectly adaptable in any manner to the problems of national defense. Other measures to strengthen control, and thus, it is hoped, further this nation's war effort, will be proposed and some will become the law of the land.

Just what effect will this war economy have upon the individual organizations which go to make up the four branches of the foundry industry? The vast majority of companies engaged in the manufacture of castings will find that the demands of war will test to the utmost the stamina of machines and the physical endurance of men. On the other hand, those foundries without defense orders, probably will be forced to close because of the inability to secure the basic raw materials essential to the casting process.

Thus far in this nation's preparation for war, shortages have developed most heavily in those basic materials used by foundries, such as alloys, pig iron, scrap, aluminum, magnesium, copper, zinc, tin, and coke. With two exceptions, these materials now appear on the priorities critical list, and their disposition will be controlled by priorities entirely upon the basis of war needs, as determined by the Army, Navy and the OPM. The amount of these and other materials available for the production of civilian goods constantly grows smaller, and before very long may reach the vanishing point.

What should the foundry industry do to meet this ever changing problem? First of all, each individual company must set its house in order, must make any necessary changes in plant or practice to meet immediate needs of direct or indirect war demands. Companies having order books loaded too heavily with materials for war must accept subcontracting as a means of producing the needed castings as quickly as possible. Spreading work also increases the available supply of skilled men, since firms still engaged in producing civilian goods may be diverted to war work.

If manufacturers of castings are to serve the nation to the fullest extent during this emergency the foundry industry as a whole and the four branches individually must provide the type of leadership that will solve the many problems occasioned by demands of the Army, Navy and OPM. Undoubtedly, the task of serving will be made easier through establishment of Industry Advising Committees of the Office of Production Management. While industry is not permitted to appoint these committees, those groups which are organized properly may wield great influence in seeing that the best possible men are available for this advisory work.

The pressing need is for co-ordination of effort in dealing with war production. To accomplish this, THE FOUNDRY believes the industry requires an overall committee composed of the elected leadership in all of the many organizations represented in the castings industry. Although this group would have no official status or sponsor, its work would further the war work by preventing duplication of effort, interindustry competition and other dangerous evils. In addition to this, each of four branches, namely steel, malleable, gray iron and nonferrous, should be prepared to advise the OPM in the appointment of the Industry Advisory Committees.

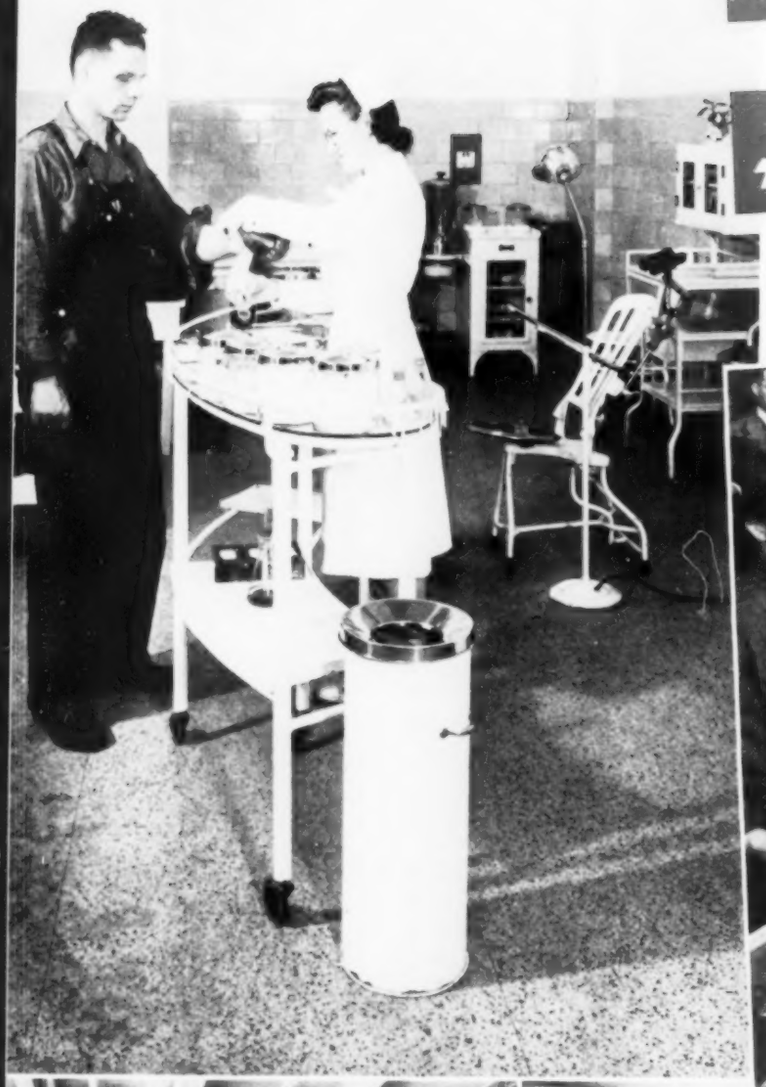
The foundry industry faces its greatest challenge since metals first were poured in molds hundreds of years ago and in all the intervening years since that time when wars big and little interfered with normal production activities.

Frank G. Steinebach

Editor

Foundry Service B

Adds to Employe's C



BUILDING COMFORT

SETTING a new high for spaciousness, convenience and cleanliness, the new foundry employes' service building of Caterpillar Tractor Co., Peoria, Ill., is regarded widely as a model structure among its kind. Designed by T. J. Connor, vice president and M. J. Gregory, factory manager, foundry division, the service building is as attractive as it is practical.

First, let us view the structure from the outside through the eyes of a foundry employe coming to work. The building constructed of brick is 264 feet long and 91 feet wide. It is one story high with the exception of a 2-story wing, 91 by 80 feet, and cost, fully equipped, $145,000.

As we enter the door our eyes travel down a 12-foot wide corridor which parallels the length of the building. Inner walls are salt-glazed brick, perforated by windows of self-washing corrugated glass. The floor is concrete.

Perhaps our shoes have picked up some dirt enroute to work. We scrape it off on a large metal grating, which covers a pit where running water, pumped from the company's artesian wells, carries off refuse. A deep cocoa mat perfects the shoe cleaning operation. Before punching in our attendance card at one of two card racks and clocks located in the hall, we wish to empty our pipe or discard our cigarette.

Because we are proud of our fine facilities and wish to do our part in maintaining them, we tap out the pipe dottle or toss the cigarette into one of a series of narrow grate-covered traps, all a part of the subterranean water cleansing system, which completely does away with unsightly sand boxes and other antiquated modes of disposal. So far as can be learned, this method is new in buildings of this type.

Our next stop is the vast locker and shower room, doors of which have screens that are doubly protective, shutting off the room from the gaze of those in the corridor, and at the same time controlling traffic of men entering and leaving.

Fig. 1—(Upper left)—First aid room. Fig. 2—(Lower left)—Building long corridor service building. Fig. 3—(Left)—Serving section of air-conditioned cafeteria has a capacity of 195. Fig. 4—(Left center)—Supervisory group attending a conference in foremen's conference room on second floor. Fig. 5—(Center below)—View of the locker and shower room. Fig. 6—(Below)—Foundry and patternmaking apprentice classroom

The panorama of the 75 by 184-foot locker and shower room is immense. Down the center of the terrazzo floor, evenly spaced are 9 circular Bradley washers, each capable of accommodating several men. Extending in bisecting rows to the walls on both sides are rows of Lyons Metal Co. steel lockers and rows of benches. Laundry and towel cabinets are located centrally. In all, there are 1600 lockers and two sets of laundry and towel cabinets. Modine individual heat units are overhead.

Fresh air, constantly circulating through the building, maintains a steady flow through the lockers, entering top louvers and emerging through perforated bottoms. This keeps clothes in good condition and draws away all locker odor.

The room also contains 4 shower bath sections, each having 20 sprays. The shower groups have black and white tiled floors with inner and outer walls and partitions of Tennessee marble. Antiseptic footbaths, shaving facilities and canopies, or hoods, which carry away steam vapors are other features. These sections are flanked by more of the corrugated glass, whereas windows admitting light to the lockers is provided by means of Libby-Owens-Ford glass block windows, freely used throughout

Fig. 7—(Upper right)—Changing clothes in new building. Ventilated lockers and circulating air carry off any odors. Fig. 8—(Right)—Canteen used in connection with air-conditioned cafeteria. Fig. 9—(Below)—Plenty of light, fresh air and elbow room in which to work is theme of new office on second floor. Operating offices in background. Personnel working at various phases of foundry planning in foreground

the building. With all 80 shower sprays and the Bradley washers often in action at the same time, provision has been made to provide plenty of heated water. Hot water for showers and other purposes is steam heated by two Whitlock instantaneous water heaters of 3000 gallons per hour capacity each. Three hot water tanks of 2500 gallons capacity each, provide a reservoir for peak loads. During peak loads, occurring at changing of shifts, hot water is used at the rate of 10,000 gallons per hour. Warm water for the showers and Bradley washers is supplied at correct temperature by Powers thermostatic water controllers which mix hot and cold water in proper proportion before it reaches the fixtures.

After preparing ourselves for work we leave the locker and shower room through the same areaway that admitted us. There are two sets of double doors leading to and from the room, but to avoid confusion, workers enter and leave by those closest to their lockers. Down the corridor we stroll, leaving the service building from the end opposite to that which we originally entered. From there it is only a matter of some 60 feet to the foundry, and our work. Now, suppose we have done a good morning's work and it is time for lunch. We (*Please turn to page* 111)

Fig. 10—(Upper left)—Inside view of Tennessee marble shower section. Windows are self-washing. Floor is black and white tile. Sections contain shaving shelves, mirror holders, antiseptic footbaths. Fig. 11—(Left)—Foremen's conference room showing supervisors making cut employe appraisal records. Fig. 12—(Below)—Metallurgical laboratory located in building scientifically controls foundry operations

Speeds Machine Tool

TO AID DEFENSE

... By PAT DWYER

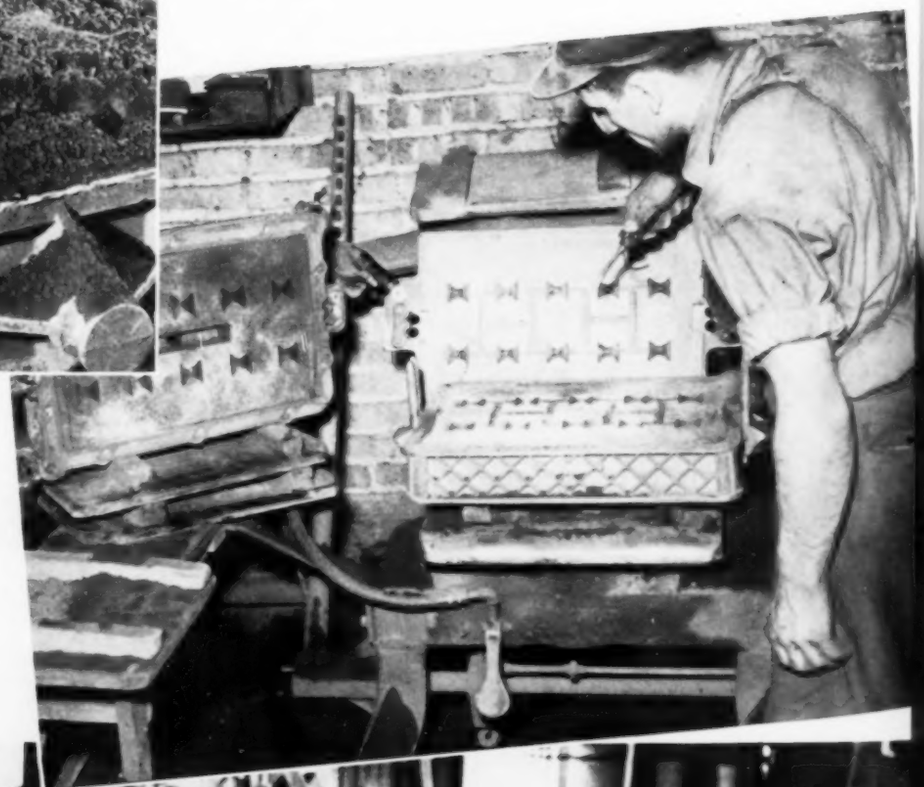


Fig. 1—(Above)—A certain amount of space is closed off in the drag to conserve time and sand. Fig. 2—(Right)—Cast iron chaplets in wide variety of sizes are made every day. Fig. 3—(Below)—Typical floor of lathe bed drag molds with cores in place. Fig. 4—(Next page)—Bed castings are poured from two ladles

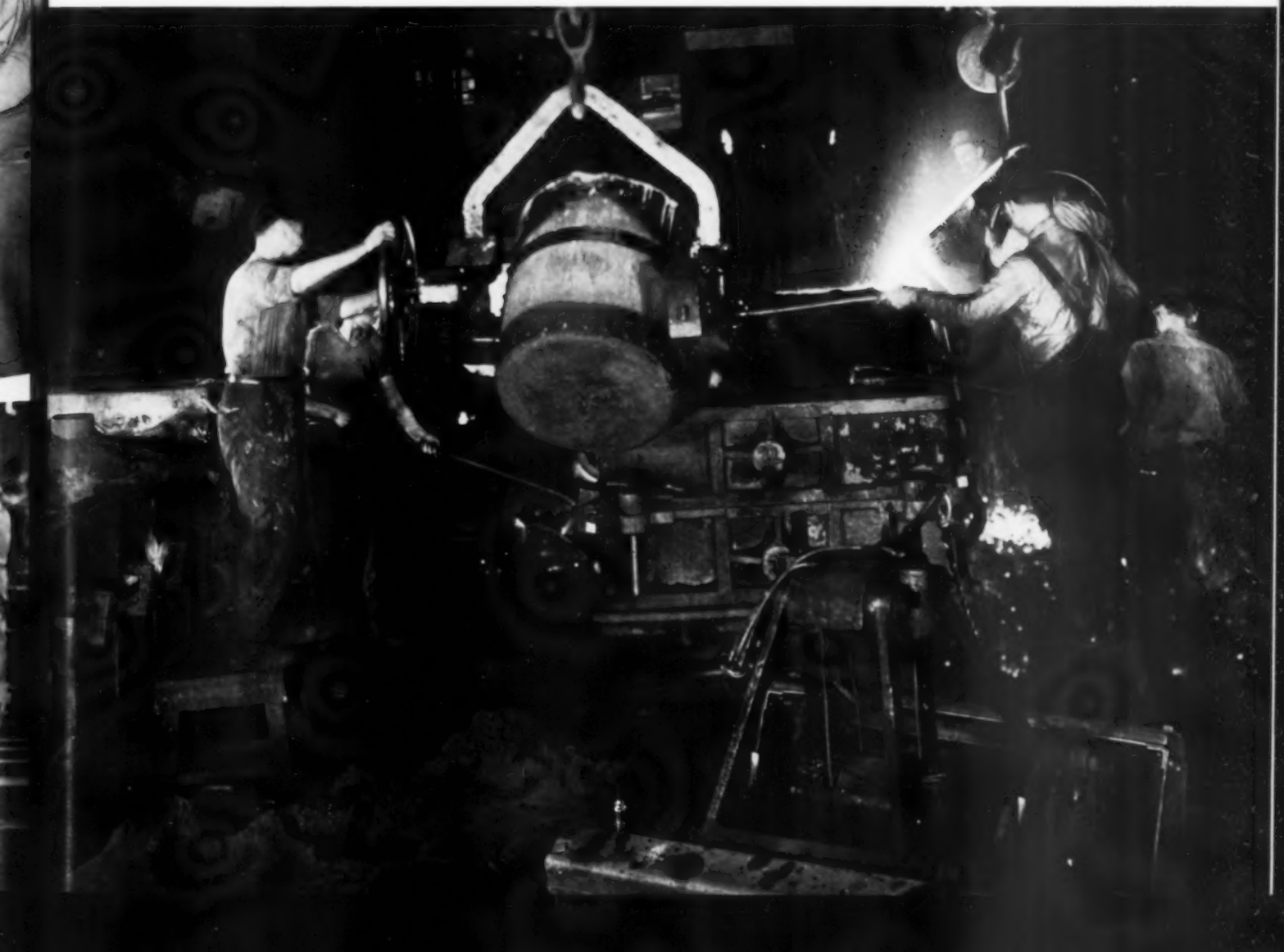
ol Production

NATIONAL and international exhibitions with their myriad attractions, interesting, instructive, educational and entertaining, are opened and spring into full flower when the President or some other important dignitary pushes a button or turns a key. A mighty ship is launched when a charming young person in full war paint and feathers according to the fashion of the period, something alongside of which the rigid old laws of the Medes and Persians retire modestly into the kindergarten—where were we? Ah, yes, the launching of the ship. The ship is launched when the beautiful daughter of a prominent official smashes a bottle of champaign somewhere in the general vicinity of the steel stem. A dictator suffering from a combination of swelled head and fanatic illusion reaches for the telephone and tells Head Man No. 1 in another country that as and of even date he is going to declare a holy war and gobble him up. G-r-r-r!

The general public does not ruffle a feather over these and hundreds of other remarkable performances. Touching a button, breaking a bottle or random shouting over the telephone are accepted as the whole story. Only a comparatively small number of people reflect on the fact that months and in many cases years were involved in planning and developing the exhibition, in construction of the ship and in creating a situation that culminated in pressing a button, breaking a bottle and in a long distance eat-'em-alive telephone call.

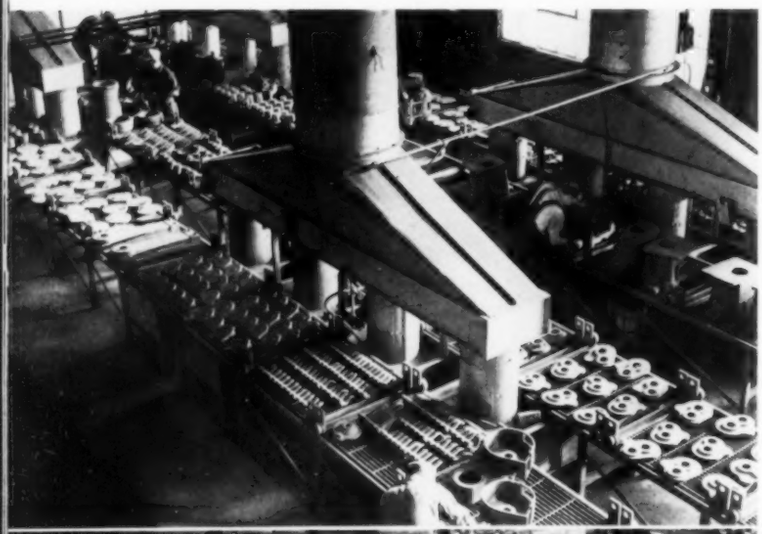
We are faced with a somewhat similar situation today with a hysterical press constantly harping on the subject of lack of materials and bottle necks in industry. Confronted suddenly with the necessity of producing goods, several billion dollars worth in excess of ordinary requirements, the public is supposed to be grieved, aggravated and astonished because the entire volume does not spring miraculously out of the ground or the air when the President pushes a button. Impatient fingers and long newspaper columns are pointed at real and imaginary bottle necks.

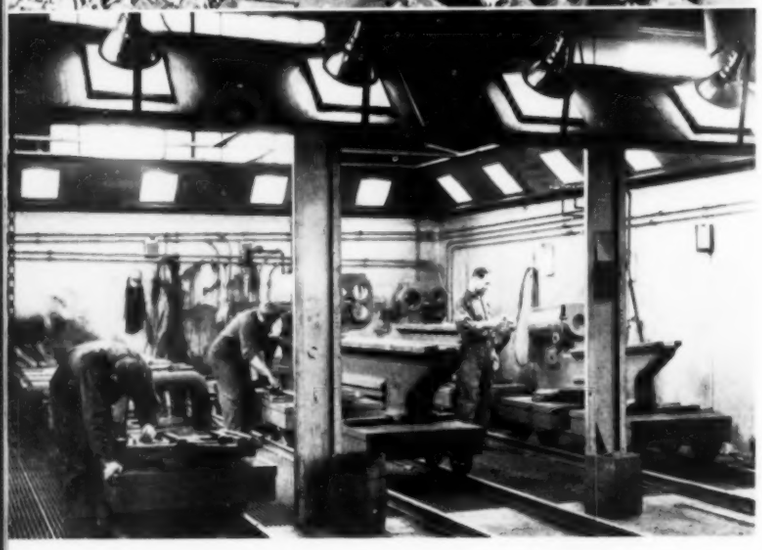
The finger pointers and impatient ones also might ponder on another homely and familiar illustration, a long freight train getting under way. Commencing at the head end the slack



is taken up between the couplings on each pair of cars until the entire string is on tension and fit to move as an articulated unit. The operation is reversed when the train comes to a stop.

The machine tool industry moving slowly since the block signals were set against it in 1929, gradually has been gathering speed in the past year or two and now with an open track and all the green lights burning clear, is whizzing into a record run that probably will be pointed to with pride for years to come. With greatly increased working forces in plants operating in most instances 24 hours per day, the flood of machine tools now pouring out of the factories may be compared to a giant cork screw that will pull the cork out of at least one bottle neck.





Gisholt Machine Co., Madison, Wis., since 1889 a prominent manufacturer of turret lathes and automatic lathes and in more recent years a companion product, balancing machines, is an outstanding example of family management. Founded by John A. Johnson, the name was taken from the original Johnson estate in Norway. Gisholt means sunny wood. Since the death of the founder, three sons have served successively as president and a fourth as treasurer of the company. The third son Hobart S. Johnson, recently retired from the presidency to become chairman of the board of directors. His oldest son George H. Johnson now is president. Another son H. Stanley Johnson is vice president, the third generation in management.

Covers More Than 10 Acres

The plant occupies a large space on the western outskirts of the city and with the group of modern buildings surrounding an air-conditioned administrative office, covers more than 10 acres of floor space. It is arranged for a straight flow of materials and thus reduces trucking operations to a minimum. A self-contained unit, the plant supplies part of the required electric current, and all steam and compressed air. The company makes all patterns and gray iron castings, machines practically the entire product, assembles, tests and ships the completed lathes in condition to be erected and immediately go into production. Turret lathes are made in nine sizes, designed to handle bar material from $1\frac{1}{2}$ to $12\frac{1}{4}$ inches and chuck work up to 30 inches. Automatic lathes are made in two sizes. Balancing machines include a static balancing model and three types of Dynetric balancing machines which will locate and measure any unbalance in rotating parts from the rotor of an electric razor up to the armature of a diesel electric motor for a modern locomotive.

Built approximately 25 years ago, the foundry 150 x 400 feet, steel and brick, roomy, light, airy and designed for economical operation, was one of the first of the type erected in the Middle West. It was (*Please turn to page* 112)

Fig. 5 (Above)—An exhaust system maintains clean atmosphere in room where castings are prepared for priming coat of paint. Fig. 6 (Center)—Miscellaneous pile of castings ready to go into the washery. Many types of gates and risers are shown. Fig. 7 (Left)—Castings are painted before they leave the foundry

U. S. HAS 4812 FOUNDRIES

NUMBER of foundries in the United States increased 36 during the past 2 years, according to data tabulated from the recently published 1941-1942 edition of *Penton's Foundry List*. The new survey indicates a total of 4812 foundries in the United States in 1941 as compared with 4776 in 1939, the gain being the first to be registered since 1922. At present Canada has a total of 447 foundries compared with 457 two years ago.

Interesting statistics on the foundry industry and the changes which are taking place, are presented in the table at the bottom of this page. As might be expected, the greatest gain during the two year period has occurred among aluminum casting shops, where the total has increased from 2129 to 2174. Much heavier demands for aluminum castings from aircraft makers should result in a continuation of this trend. Changes in other divisions include a decrease of 48 gray iron foundries, loss of one steel foundry and an increase of two malleable foundries. The survey also indicates an increase in total foundry capacity through modernization programs and many additions to existing plants.

Nineteen states experienced an increase in total foundries, according to the survey. Pennsylvania, with 557 shops, continues as the leading foundry center of the United States, and Ohio is second with 507. Illinois with a total of 385 has moved into third place, ahead of New York which has 382 foundries. Among the cities, Chicago still holds the lead with 162 foundries while Los Angeles has advanced to second place with 112. New York is third with 108, and Cleveland dropped to fourth with 106. Detroit is fifth with 85 foundries.

Foundries of the United States and Canada—1941 and 1939

	Total Foundries 1941	Total Foundries 1939	Increase or Decrease in two years	Gray Iron Foundries 1941	Gray Iron Foundries 1939	Steel Foundries 1941	Steel Foundries 1939	Electric Steel 1941	Electric Steel 1939	Malleable Foundries 1941	Malleable Foundries 1939	Exclusive Nonferrous Foundries 1941	Exclusive Nonferrous Foundries 1939	Nonferrous Foundries Dept. of Other Shops 1941	Nonferrous Foundries Dept. of Other Shops 1939	Aluminum Foundries 1941	Aluminum Foundries 1939	Total Nonferrous Foundries 1941	Total Nonferrous Foundries 1939	Permanent Mold 1941	Permanent Mold 1939	Machine Shop 1941	Machine Shop 1939	Pattern Shop 1941	Pattern Shop 1939	Laboratories 1941	Laboratories 1939
Alabama	80	88	-1	80	78	4	5	2	1	2	2	8	8	20	22	17	15	28	30	1	2	65	64	67	65	16	17
Arizona	6	6		6	6	2	2	2	2					5	5	3	3	5	5	2	2	4	4	6	6		
Arkansas	21	19	+2	18	16	1	1	1	1			2	2	10	10	7	8	12	12			16	16	10	11	3	2
California	302	274	+28	137	133	21	23	19	20	3	3	128	106	70	71	165	144	198	177	14	9	145	128	149	133	50	35
Colorado	45	45		27	23	3	3	2	2	1	1	13	13	8	7	20	20	21	20	3	1	26	26	21	19	11	7
Connecticut	122	125	-3	59	59	6	6	5	5	7	7	57	56	29	30	70	69	86	86	2	2	80	81	78	76	35	34
Delaware	11	11		5	5	2	2	1	1	1	1	3	3	4	3	4	4	7	6			9	9	8	8	3	2
Dist. of Columbia	1	3	-2	1	3	1	1	1	1					1	2	1	2	1	2			1	1	1		1	
Florida	29	31	-2	25	25	1	1	1	1	1	1	4	6	23	20	24	22	27	26	1	1	22	20	25	22	3	3
Georgia	65	64	+1	56	54	2	2	1	2			7	7	35	33	33	33	42	40	1	1	44	41	51	46	1	1
Idaho	7	7		6	7									6	7	4	5	6	7			6	7	6	7		
Illinois	385	369	+16	217	214	23	19	13	12	19	19	136	123	73	76	170	161	209	199	27	18	229	208	240	232	88	58
Indiana	199	199		131	134	9	10	7	7	10	11	55	52	49	47	79	81	104	99	5	5	115	117	131	132	43	38
Iowa	80	76	+4	57	62	4	4	2	2	2	2	13	9	30	29	36	33	43	38	1	1	54	56	56	51	18	20
Kansas	49	52	-3	42	44	1	1	1	1			7	7	30	28	30	27	37	35	3	3	39	37	35	36	9	10
Kentucky	36	39	-3	25	29							10	8	10	13	13	12	20	21	1	1	23	23	22	22	3	2
Louisiana	30	29	+1	25	24	5	5	4	4			4	3	18	17	15	11	22	20			21	20	23	21	4	2
Maine	25	28	-3	23	26							2	2	16	19	12	15	18	21			14	17	18	20	2	2
Maryland	48	52	-4	34	37					1	1	13	14	15	17	19	21	28	31			31	33	26	29	10	9
Massachusetts	211	213	-2	117	120	9	8	8	7	5	5	85	83	45	46	101	103	130	129	3	3	99	102	102	101	42	31
Michigan	318	313	+5	180	180	21	21	15	15	11	10	108	106	70	60	123	118	178	166	17	10	185	184	180	189	96	86
Minnesota	98	95	+3	71	67	4	4	3	3	1	1	22	20	30	29	41	40	52	49	7	4	63	63	56	55	17	10
Mississippi	14	12	+2	13	11							1	1	9	9	5	4	10	10			13	12	6	6	2	2
Missouri	116	113	+3	68	69	9	8	7	7	2	2	36	37	19	18	45	47	55	55	6	2	61	66	73	77	29	25
Montana	9	7	+2	9	7									9	7	4	3	9	7	1		9	7	8	6		1
Nebraska	21	28	-7	16	20	1	1	1	1			4	7	11	13	13	18	15	20			17	20	17	20	3	2
Nevada	3	6	-3	3	6	1	2	1	1	1	1			3	6		4	3	6				5	3	6	1	
New Hampshire	24	27	-3	16	17	2	2	1	1	1	1	7	9	10	10	13	14	17	13			17	15	15	14	2	3
New Jersey	176	177	-1	85	93	6	6	5	5	4	4	83	74	31	31	96	85	114	105	3	2	94	98	88	93	36	34
New Mexico	1	1		1	1									1	1	1	1	1	1			1	1	1	1		
New York	382	393	-11	216	226	15	16	12	12	15	15	142	136	101	103	187	185	243	239	14	8	238	242	230	232	81	81
North Carolina	63	63		60	60							2	3	42	44	35	38	44	47	3	2	41	40	46	45		1
North Dakota	5	5		4	4							1	1	3	3	2	2	4	4			5	4	5	5		
Ohio	507	511	-4	289	290	34	33	26	26	21	19	177	170	82	86	212	221	259	256	23	18	298	303	295	302	138	107
Oklahoma	36	35	+1	25	22	1	1	1	1			10	11	15	13	22	21	25	24	2	1	27	23	26	23	3	3
Oregon	55	50	+5	40	36	5	4	3	4			9	10	22	22	23	26	31	32			25	26	30	28	7	3
Pennsylvania	557	560	-3	350	380	58	61	33	32	17	15	137	132	155	175	209	215	292	307	13	11	365	396	363	386	132	137
Rhode Island	36	33	+3	16	14	1	1			3	2	19	18	6	6	23	21	25	24	1		14	13	16	14	8	8
South Carolina	19	20	-1	19	19		1							15	15	13	13	15	15	1		13	12	11	11	1	1
South Dakota	3	3		3	3									2	2	2	2	2	2	1		3	3	2	2	1	1
Tennessee	73	66	+7	60	56	3	3	2	2			8	10	29	26	23	21	37	36	1	1	52	47	55	54	16	13
Texas	104	96	+8	70	65	9	8	8	6	1	1	28	24	40	37	56	46	68	61	3	2	61	59	78	63	16	11
Utah	18	16	+2	15	14	1	1	1	1			3	2	9	9	10	8	12	11			8	9	9	9	4	4
Vermont	16	20	-4	14	16							2	4	8	10	6	8	10	14			12	13	12	14		
Virginia	71	72	-1	68	69	3	3	2	3			3	2	42	42	36	37	45	44	3	1	48	49	46	46	9	8
Washington	80	80	+10	58	58	14	12	12	11	1	1	23	18	33	37	44	43	56	55	4	4	37	32	42	41	14	12
West Virginia	39	41	-2	28	29	2	2	1	1	1	1	9	10	19	19	21	19	28	29	3	3	28	29	30	30	8	9
Wisconsin	196	202	-6	117	123	14	15	13	13	10	12	64	63	39	41	85	79	103	104	8	7	114	126	111	129	56	53
Wyoming	1	1		1			1		1					1	1	1	1	1	1		1	1		1			
Total	4812	4776	+36	3006	3054	298	299	217	215	141	138	1445	1370	1353	1377	2174	2129	2798	2747	178	126	2894	2906	2930	2941	1022	888
Alberta	14	13	+1	11	11	1	1	1	1			2	2	10	10	12	12	12	12	1	1	13	12	11	11	1	1
British Columbia	48	41	+7	35	32	5	5	5	5	1		9	8	27	26	30	27	36	34	1	2	26	25	28	29	6	7
Manitoba	14	14		8	8	2	2	2	2			5	5	3	2	8	7	8	7	1	1	11	9	9	8	6	5
New Brunswick	11	10	+1	10	9							1	1	7	8	5	7	8	9			10	8	9	7	2	
Newfoundland	3	3		3	3	1	1	1	1					3	3	3	3	3	3			3	3	3	3	2	2
Nova Scotia	21	22	-1	19	19	2	2	1	2	1		1	1	15	15	10	8	16	16	1		16	15	16	17	2	
Ontario	244	260	-16	179	191	8	8	4	5	11	10	50	56	94	98	120	125	144	154	10	7	182	195	164	169	40	31
Prince Edward Island	2	3	-1	2	3									1	2	1	2	1	2			2	3	1	1		
Quebec	85	86	-1	59	59	9	9	8	8	1	1	18	19	43	40	57	56	61	59	7		61	64	60	61	24	26
Saskatchewan	5	5		5	5									5	5	4	4	5	5			4	4	4	4		
Total	447	457	-10	331	340	28	28	22	24	14	11	86	92	208	209	250	251	294	301	21	11	328	338	305	310	83	72
Total in U. S. and Canada	5259	5233	+26	3337	3394	326	327	239	239	155	149	1531	1462	1561	1586	2424	2380	3092	3048	199	137	3222	3244	3235	3251	1105	960

GATING NONFERROUS IS IMPORTANT

IN PREVIOUS discussions on gating castings mention frequently has been made of a restriction in the runner or gate without much detailed information regarding factors governing its use and reasons for its application. The first objective of a restriction in a gate is to set up a valve or controlling point in the gating system to establish a given rate of flow of metal and to hold back the inrush of metal from the sprue.

It is necessary to hold back this inrush of metal so that the sprue may be held full during the pouring period; otherwise drosses and dirt may be carried down the sprue and later into the casting cavity to form defects. Furthermore, if the metal rushes down the sprue with sufficient rapidity it will take a spiral direction which will suck in dirt and air and consequently may result in an emulsion of dirt, dross, air and metal—a combination that cannot possibly produce good castings.

Of course, the usual practice is to have a sprue of sufficient size to permit of the ready flow of metal into the mold and from the base of the sprue have one or more runners and trust to the size of these runners to produce a sufficient retarding effect to enable the sprue to be kept full. However, that may or may not be always the case.

There may be a momentary period when the gate has a capacity to absorb all of the metal entering the sprue and there is nothing to prevent emptying of the sprue even though a substantial quantity of metal is being poured from the ladle or crucible into it. A restriction of properly designed size and shape should be a definite part of the runner leading from the sprue to the series of gates connecting the castings. The runner should be shaped as illustrated in Fig. 43.

Pour Metal Rapidly

By the intelligent control of the size of the area the control of flow into the casting can be established definitely for each and every size casting being poured and for each and every condition that demands a variation in the speed of flow of metal. Consequently, those handling the crucible or pot of metal to simply pour the metal into the mold as fast as the sprue will take it, being careful of course to keep the sprue full.

Therefore, no particular skill is necessary in the pouring of molds that are provided with scientifically designed gates in which the proper restriction is provided at its proper location. That enables the pouring gang to be made up of men who are not molders and have not had much training in the foundry prac-

Fig. 43—General details of restriction in gate to show approximate forms. Fig. 44—Exit slope of restriction from B to C should be gradual to eliminate nozzle effect. Fig. 45—Restriction should be near base of sprue and some distance from casting cavity. Fig. 46—Application of gate restriction with horn gate. Fig. 47—(Right above)—Pouring brass castings in Brooklyn Navy Yard. OEM Defense Photo by Palmer

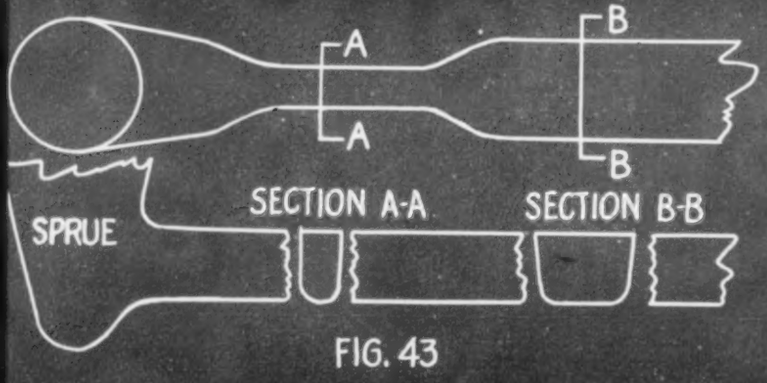


FIG. 43

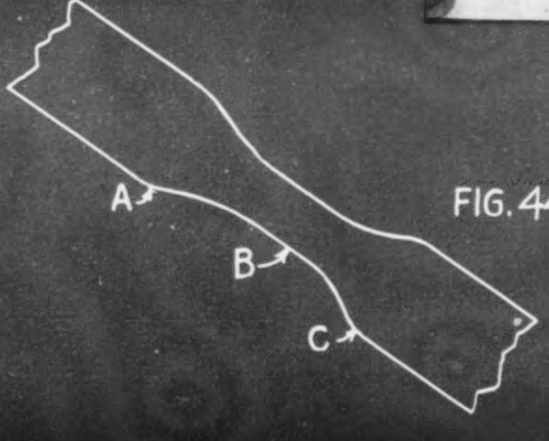


FIG. 44

CASTINGS

By N. K. B. PATCH

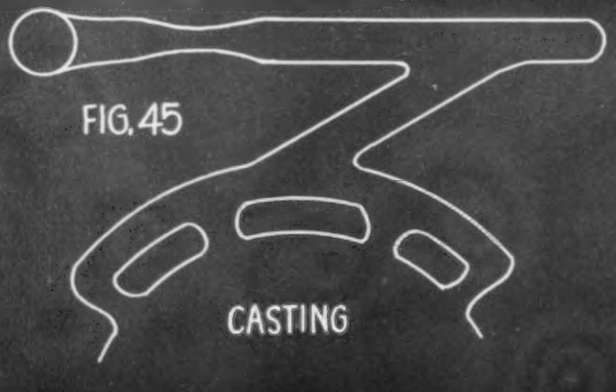
tice. The resultant castings will show no defects that are traceable to the improper pouring; a vital step in the process of making castings.

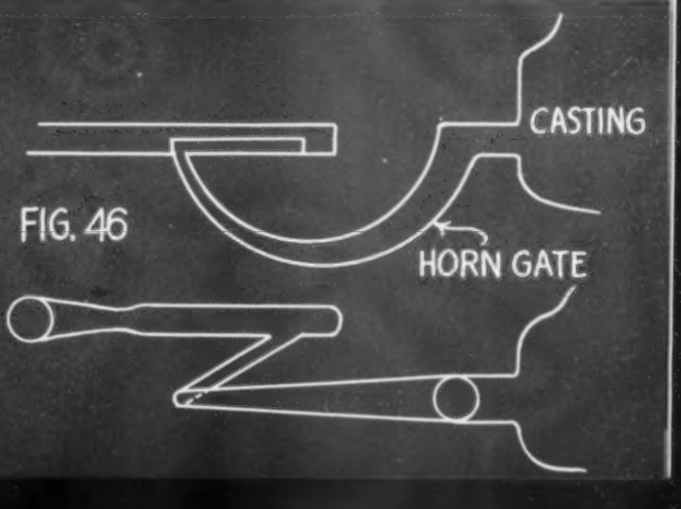
The first important factor in the use of this method of controlling the speed of castings is to see that the restriction is located at the right point in the gate system. It must be located relatively close to the base of the sprue and at the same time far enough away from where the metal starts to flow into the casting cavity so that the stream will have quieted down completely to a steady quiet flow. It must be located so that it does not cause erosion of the mold and result in loosened sand that will be carried with the metal into the mold cavity.

In Fig. 45 a typical application of such restrictions is suggested in respect to its location with relation to the metal coming down the sprue and the metal passing through the gate into a series of small gates leading to the casting. Design of the restriction may vary. Some of the gates now called skim gates and to which much credit is attached for successful production of castings in reality owe their success more to their restriction effect than to the actual skimming that occurs. However, they usually have orifices of predetermined size and in consequence of such standardization of size, shape and location they regulate the flow of metal into the mold.

By the variation of size and shape definite results may be predicted as to the speed of flow and the amount of metal available for entrance into the mold at a given period. There may be some value in some types of skim gates that have a definite provision for a cavity into which the skimmings may flow provided the metal flow is controlled so that there is no tendency to have surges which will rush the skimmings up into the cavity and then allow them to fall back into the passing stream of metal to be carried into the flowing stream of metal leading into the castings.

Therefore, to (*Please turn to page* 115)





SOME FUNDAMENTAL

Foundry

CONSIDERABLE criticism regarding the method adopted by the American Foundrymen's Association for preparing the standard compression test for sands has been offered by Buchanan, *Foundry Trade Journal*, 1933 and 1937, and is undoubtedly well founded and worthy of consideration in research work.

Buchanan has pointed out that the A. F. A. method of test preparation is influenced by such factors as "flowability, resistance to ramming, or internal friction" due to moisture changes in the sand. To these factors may also be added the influence of the amount and type of clay binder.

The present investigation is an attempt to clarify the apparent deficiencies of the A. F. A. method through a study of factors which influence the ramming process, and to better understand its advantages and limitations.

Fig. 1—Magnified views of the sands used in the investigation with the round grains at the left, and angular grains at the right

The primary factors of any sand are the shape, size and distribution of the grains, amount and type of clay, water content, and grain surface condition. Such properties as strength, permeability, flowability, etc., are secondary factors. This study shows the influence the primary factors have on the secondary factors when testing specimens prepared by the standard A. F. A. method.

The present article deals with experiments to determine the effect of water on washed sand grains, both round and angular, with regard to permeability, density, and flowability. This data on clay-free grains will serve as a basis or foundation for work to be reported in the second phase of this study, namely, the effect of varying amounts of clay, oil, and water.

The Ottawa sand was selected as typical of round sand grains, whereas the angular sand was an Ohio crushed silica sand. All sands were thoroughly washed free from clay and dried before using. Table I gives the sieve analysis of these sands, and Fig. 1 shows the general shape of the grains.

Sand and water were mixed for a half minute in a small laboratory "Wingmixer" (Riehle Brothers). With this type of mixing, the grains were subjected to a minimum milling action which is of considerable value since it minimizes the wear and preserves the surface condition of the grains.

All test specimens were rammed on an A. F. A. standard rammer equipped with a Dietert flowability dial divided in units of 0.001-inch. By means of this dial, the height of the rammed specimen was maintained at 2 inches, ± 0.005-inch. Flowability values were also obtained by means of this dial, and represented the change in height of the specimen between the fourth and fifth blow as described by Dietert, *Transactions*, American Foundrymen's Association, 1934.

Moisture content was determined on the sand in the rammed specimen. That was necessary since at high moisture contents, the capillary forces in an unrammed sand in the muller were not great enough to keep the water from draining out of the sand. This was especially true for the 30- and 40-mesh sands. Moisture was measured by Dietert's "minute moisture teller."

Permeability numbers were calculated from data based on the time required for two liters of

ASPECTS OF Sand

By E. J. ASH, Associate Professor

and ERIK O. LISSELL

University of Michigan, Ann Arbor, Mich.

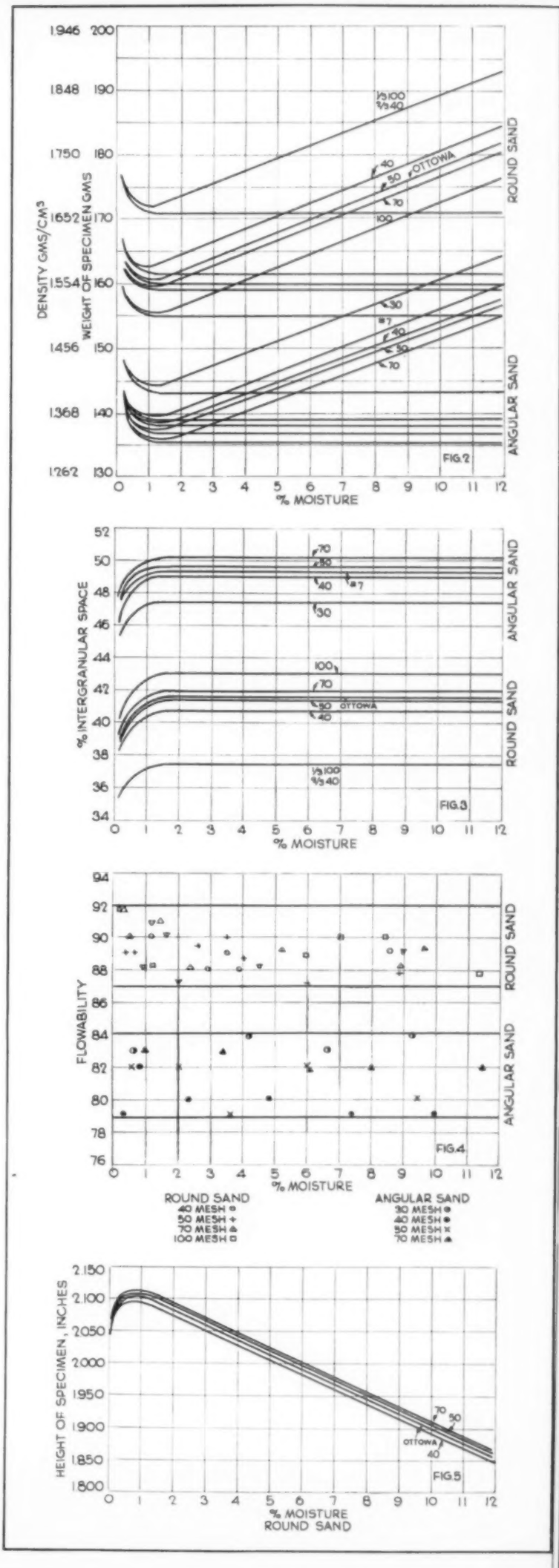
air to flow through a standard specimen under a measured pressure.

In this phase of study concerned with the grain-moisture relationships, only permeability values will be considered. Under circumstances of this test, permeability is influenced by (1) actual amount of voids present, (2) actual surface area of grains, (3) shape of the voids, and (4) the surface condition of the sand grains. These factors will be influenced by the sand-water mixtures and ramming method used as follows: 1. Sand, according to grain size, shape, and surface condition. 2. Water, according to the amount and surface tension. 3. Degree of compression of the sample.

Difference in Test Specimens

Chief difference between the British and American test specimens is the degree of compression. The British specimen is compressed to one or more standard densities before testing. The A. F. A. specimen is rammed by allowing a fixed amount of kinetic energy to be converted into compression work. However, it is impossible to convert more than a certain amount of this energy into compression. The remainder is dissipated in the form of heat in overcoming frictional resistance between the grains. The frictional resistance is different for different sands. Hence, the work done in compressing any sand will vary even though the energy input is constant. This has been pointed out earlier by Adams, *Transactions*, (*Please turn to page* 118)

Fig. 2—Effect of moisture on density of green and dry rammed samples. Curve marked Ottowa represents unsieved round grain while No. 7 is unsieved angular grain. Fig. 3—Effect of moisture on intergranular volume of round and angular sands of various meshes. Fig. 4—Flowability-moisture relationship of round and angular sands of various sizes. Fig. 5—Effect of moisture content on height of rammed specimens of round grain sand when weight is constant



Canadian Foundry

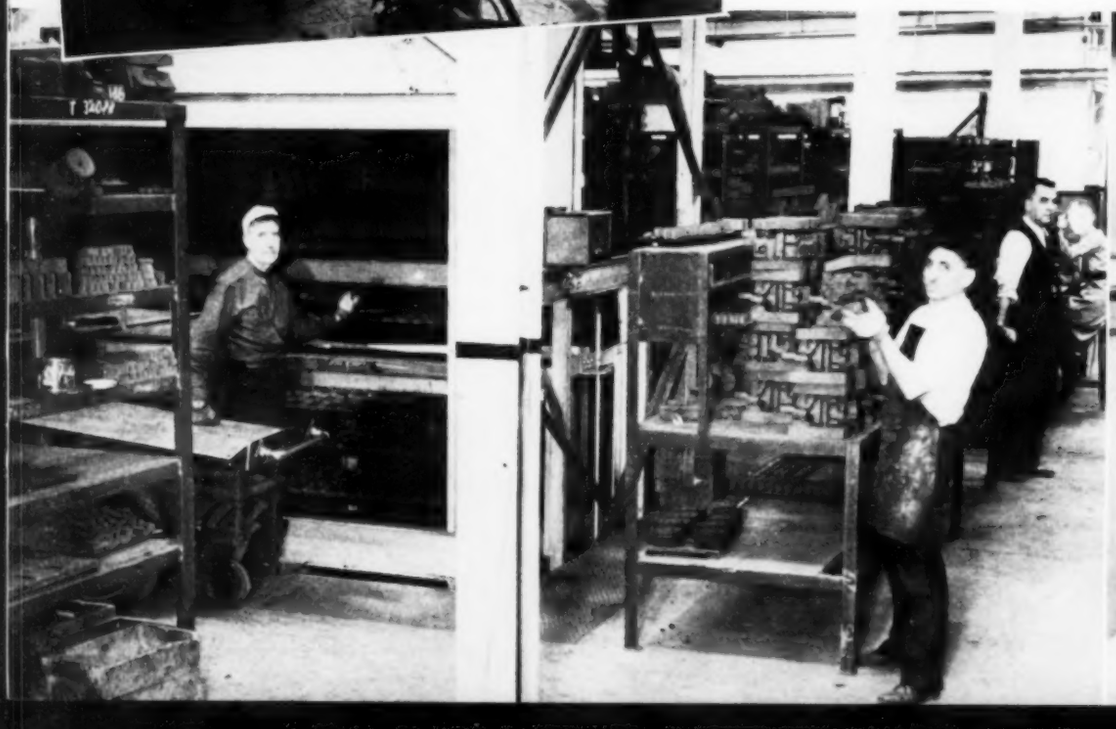
OPERATES MECHANIZED SHOP

FOLLOWING a general survey of existing conditions in the gray iron and nonferrous foundries of the Canadian Westinghouse Co., Hamilton, Ont., with a view of securing increased production on reduced floor space, a careful analysis by management and staff indicated the necessity of coordinating all operations as far as possible, reduce the varieties of sand, substitute mechanical for hand preparation, substitute tapered jackets and aluminum snap flasks for a large number of small wood flasks and introduce more accurate and complete methods of production control.

Castings made in this foundry range in weight from a few ounces to many tons and in quality from a plain machineable iron, to high class metal for air brake parts. The problem was not one of high speed production, but one of semi-production. Roller conveyors were installed in front of all machines with capacity for a certain number of molds to synchronize with the melting speed of the cupolas and with the equipment for distributing the molten iron.

Reference to air hoists and transfer car by which heavy molds are placed on the conveyor lines was made in a preceding article. The molds are pushed along the conveyor to the pouring station and then shunted to a cooling space where they are lifted by a jib crane to a mechanical shakeout. The sand falls into a hopper and then to a belt conveyor which carries it under the floor and across the shop to the sand preparation plant. Small and medium weight castings are loaded in tote boxes and transported by electric truck to the cleaning room at the end of the main bay. Snap flask molds are handled in a similar manner except (*Please turn to page* 107)

By Pat Dwyer



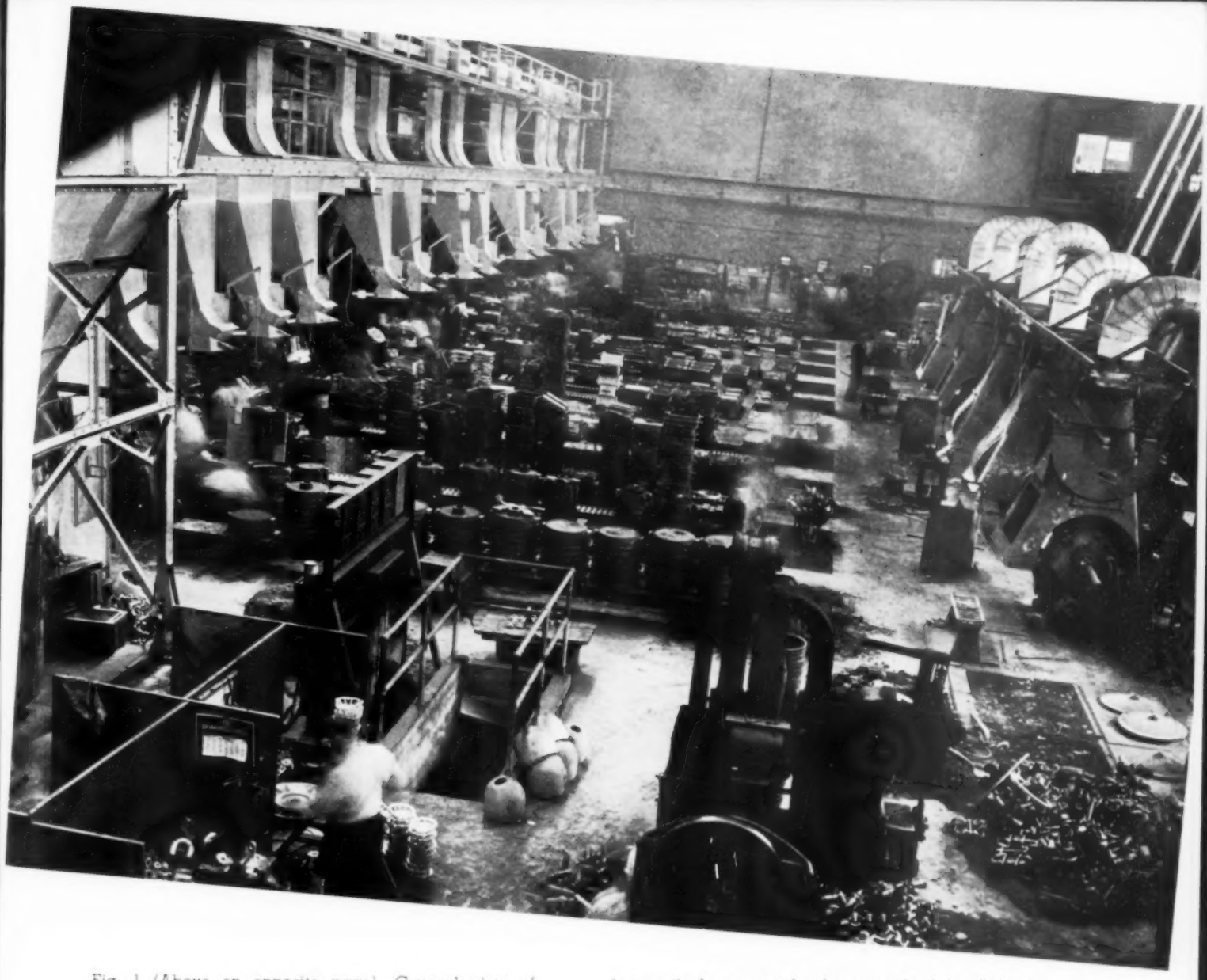


Fig. 1 (Above on opposite page)—General view of nonferrous foundry from west end. Figs. 2 and 3 (Left and center on opposite page)—Cores are removed from vertical oven at lower floor level, loaded on racks and taken to the assembly room where they are made up on jigs and inspected. Fig. 4 (Center below)—Small cores made by girls at small individual benches on the second floor are dried in the circulating vertical oven partly shown at the left. A battery of core blowing machines operates on the opposite side of the oven. Fig. 5 (Right below)—Green sand cylinder cores are swept on cast iron barrels. Fig. 6 (Above)—General view of nonferrous foundry from east end showing sand chutes, roller conveyors at the left and center and the battery of hooded electric furnaces at the right

CONVENTION PHOTOS
Courtesy Sterling Farmer, Sand Products Corp., Cleveland

QUESTIONS and ANSWERS

Sand Burning on to Castings Leaves a Rough Surface

Lacking a sandblast we have trouble cleaning castings too large to go in the tumbling barrels. We have tried all kinds of facing, but none prevents the sand from burning on to the face of the castings. We melt and pour our iron very hot. We do not like to use coolers and our shop crew is too small to wait until the iron cools by itself. Do you think skin drying the molds would solve the problem? We shall appreciate information on skin drying technique.

Sand burns on to the face of a casting because the sand is not sufficiently refractory and the reason it is not sufficiently refractory is because the silica content is too low and the clay content is too high. Therefore the first step in your program is to use a high grade refractory base sand for the facing. This will correspond in a general way to No. 2 Albany sand. According to A. F. A. standards this sand will show: Moisture 4 to 6.5 per cent, permeability 80 to 120, green compression strength 5 to 7.5 pounds, deformation 0.012 to 0.016 inches, clay substance 8 to 13 per cent, fineness No. 61 to 50, sintering 2500 degrees Fahr. Your reference to using all kinds of facing raises a question in our mind as to whether you meant the facing sand, or a coating of some kind shaken through a bag, applied with a brush or rubbed on by hand.

We are led to wonder also if you added sea coal to your facing sand. Castings up to several thousand pounds in weight peel readily when molded in green sand where the open, permeable facing contains from 8 to 10 per cent sea coal and where the surface is covered with any of the commercial facing materials, ground coal or coke, plumbago, graphite or talc. Promotion of a clean skin by coal dust in green sand, and by skin drying another mold is based on the well known fact that molten iron is covered with a thin film. Thickness of the film increases with drop in temperature. Coal dust sand or skin dried sand extracts the heat more rapidly than plain sand. The thickened film prevents the metal from burning the face or from penetrating between the sand grains. The skin drying technique is quite simple. The coal dust is omitted from the facing sand and is replaced by approximately half the amount of any core binder used in making core sand mixtures. After the mold is finished it is sprayed, brushed or swabbed with liquid blacking. In some instances the blacking is rubbed on dry by hand and then painted with thin molasses water. The mold is dried by torch or in any other convenient manner.

Wants To Know How To Add Iron To a Copper-base Alloy

Please advise what kind of iron to use and how to amalgamate 20 per cent with copper, lead and tin.

To alloy 20 per cent iron to a copper base alloy is quite difficult and not very often results in a very satisfactory material. The product tends to be very brittle and since iron has a ready solubility for carbon which converts it to cast iron, the material is likely to give trouble. Furthermore, it is very difficult to alloy completely such a high percentage of iron and results in some free iron which readily rusts and gives serious trouble.

Iron and copper do alloy up to a reasonable percentage of iron, and zinc and iron form an alloy. So if your composition has a good deal of zinc in it you can add quite a little iron and have it completely alloyed. However, the resulting alloy is extremely brittle and of little commercial value. The best way to add iron to a copper-base alloy is to use thin tin-plate which of course is nothing but sheet iron coated with a thin coating of tin.

The tin oxidizes and is negligible in the calculation of the percentage of tin present in the resulting alloy. The iron is protected from oxidation by the presence of the tin and is free to amalgamate with the copper or zinc as the case may be. Charge some of the iron with the copper and superheat until the entire charge is fluid. Thereafter add additional pieces of sheet tinplate until the entire amount of iron has been added. Be careful not to add enough iron at any one time to reduce materially the fluidity of the bath into which the iron is being plunged.

You do not state what composition you contemplate making. Therefore, we are not aware of what the percentages are of zinc, tin or lead. If you are contemplating making a composition containing 10 or more per cent zinc, some zinc can be added to the copper-iron solution even before final addition of the iron so that some iron may alloy with the zinc making.

Suggests a Bronze For Gear Blanks

Recently we received an order for blank gears weighing about 6 pounds each, and desire information on the alloy best suited for them. We have a choice of 88-10-2 or the 88-8-4 alloys. Which would you prefer and why?

Without definite knowledge as to the application of the gears you mention, it is difficult to make a proper decision on the more suitable alloy. If the gears are spur or bevel type, we believe that you will need the higher tin content of the 88-10-2 alloy to obtain the necessary hardness to withstand the rubbing action during mating of the gears. The 88-10-2 alloy is usually employed for those gears although some prefer to use a phosphor-bronze containing 89 per cent copper and 11 per cent tin, deoxidized with phosphorus. The increased tin content adds to wear resisting qualities and hardness as compared to an alloy containing only 10 per cent tin. However, there are some who believe that the addition of 2 per cent zinc has some hardening value, making a bronze that gives a good account of itself. We are fully aware that there are many thousands of gears made of the 88-10-2 alloy in service which are giving satisfactory results.

Small Iron Pulleys Show Shrinkage

We have trouble with shrinkage in small cast iron pulleys, approximate weight 22 pounds. We have experimented with every type of gates and risers. We have tried them with no riser, riser on rim opposite gate, riser directly over gate, large and small gates, large and small risers. Perhaps we have not tried proper combination, or perhaps our iron is at fault.

We are handicapped to a certain extent in offering an opinion, since you do not give dimensions, metal thickness, or metal composition. Off hand and basing our opinion on the fact that you have tried various combinations of gates and risers, we should say that the casting is not properly proportioned. The average small pulley presents no difficulty. The metal may be poured through practically any type of gate and no risers are necessary. There is a possibility that the fault may lie in the molding practice. You may be molding the pulley in a snap flask and the mound of sand later is enclosed in a loose, ill fitting jacket. When the mold is filled with metal the sand wall yields a little at the bottom, the metal in the upper part of the mold sinks and a shrink hole is developed near the top.

If that is the trouble the remedy is obvious. Make the mold in a close fitting jacket or preferably in a tight flask, raise the sprue 3 or 4 inches with a cup to produce a little extra pressure fill the sprue slowly when the mold is filled and you should have no further trouble. If the flask is not at fault and if the design is wrong and cannot be changed, you can adopt an expedient common in malleable and steel foundries. Stick a ring of large head nails (horse shoe nails) in the body of sand forming the inside of the mold in the cope. The heads project into the casting and serve as interior chills. One or two experimental runs will determine the number of nails necessary. The heads must be perfectly clean and dry. Otherwise they will cause the iron to boil and kick in the vicinity.

Cement Is Used as A Core Binder

Do you know of any foundry where cement or plaster is used as a core binder, where the cores do not have to be baked? Any information on this subject will be appreciated.

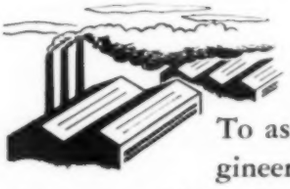
So far as we know the first published reference to the use of cement as a core binder appeared in *Principles of Iron Founding*, by the late Dr. Moldenke. First edition of this standard work of reference was published in 1917. In the chapter devoted to core binders he claims that while in active charge of a large foundry in the Pittsburgh district he and John Smith worked out a system for using cement bonded sand in small and large cores. In recent years several articles in THE FOUNDRY have described plants where the core sand is bonded with cement. The usual mixture is one part cement to 9 parts sand with just enough water to dampen the material and allow the cement to set. The cores are not placed in an oven, but are set aside for approximately 24 hours. The proprietary Randupson process in which cement bonded sand is used for making molds and cores was described in a series of four articles which appeared consecutively in the Dec., 1935, Jan., Feb., and March, 1936 issues of THE FOUNDRY. Several firms are casting aluminum and other low melting point metals in plaster molds. Metal is poured into some molds by gravity and into others under pressure. The molds are made as in ordinary plaster practice and dried in an oven for periods ranging from 10 to 24 hours, depending on the size, at a temperature between 250 and 400 degrees Fahr.

Tube Casting Hard On Both Ends

We are forwarding for your inspection a small gray iron tube casting 11 inches in length, 1¼-inches diameter on the outside, ⅛-inch metal thickness with a 3½-inch diameter flange ¼-inch thick ¾-inch from one end. Castings are molded three in a flask 12 x 18 inches and gated at both ends, a flat gate on the joint at one end and a knife gate on the outside of the flange at the other end. Our customer complains that the flange end is too hard to machine. The castings are exceptionally clean and smooth, but a number of patches on the surface are glassy. The molds are made in Albany No. 0 sand, strengthened with some bonding sand and worked as dry as possible. Iron poured at a high temperature shows the following approximate analysis: Silicon 2.31 per cent, manganese 0.57 per cent, phosphorus 0.21 per cent, sulphur 0.09 per cent.

The glazed patches on the surface are caused either by a sand that is too high in green bond strength, or one that contains too much sea coal. Omit the bonding sand and the sea coal from the mixture. The sand also is partly responsible for the hard metal in the ends of the casting. The metal composition is in the chillable range when poured into a thin casting. It is so close that a slight variation in the condition of the sand is sufficient to throw it under or over the line. This slight difference is shown at the plain end where the metal flows in until the mold is filled. The sand around the end of the casting becomes heated from the flowing metal and prevents it from chilling. At the opposite end the collar is filled from the back wash.

The first metal to enter the collar stays there and becomes not exactly chilled, but densified in contact with the cold sand. You have a choice of two alternatives. Place a narrow wedge gate directly on top of the collar, or change the metal composition. A stream of metal flowing in through the top of the collar will preheat the mold and core in the vicinity and prevent the chilling effect. The metal composition can be changed by raising the silicon content to approximately 2.50 per cent. You can add ferrosilicon or silvery pig to the cupola charge or add powdered ferosilicon to the stream flowing into the ladle. Addition of approximately ½ per cent nickel has the same general effect. Under certain conditions a small quantity of graphite stirred into the metal will eliminate the tendency to chill. Incidentally you may be interested to learn that hard extremities of thin castings may be rendered machinable by heating them to approximately 1000 degrees and then covering them while they cool slowly.



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MEN OF INDUSTRY

GEORGE M. COVEY has been connected with the Advance Aluminum Castings Corp., Chicago, since January. Mr. Covey was with the Fairbury Windmill Co., Fairbury, Neb., for 12 years, 5 of which were as foundry superintendent. In 1923 he became associated with the Curtis Bay Copper & Iron Works, Baltimore, as foundry superintendent and assistant metallurgist. In 1928 he became foundry superintendent and metallurgist for the Dexter Folder Co., Pearl River, N. Y. Prior to his present position, he had been with the Wright Aeronautical Corp., Paterson, N. J. since 1939.

♦ ♦ ♦

C. W. MILLER recently has been appointed foundry superintendent, Le Tourneau Co., Toccoa, Ga. Mr. Miller after finishing school served a molder's apprenticeship with the Coshocton Iron Co., Coshocton, O., and moved with the plant when it was transferred to Monongahela City, Pa. After finishing his apprenticeship he obtained a leave of absence in order to work at the Mesta Machine Co., Homestead, Pa., and at McIntosh-Hemphill, to get experience on heavy work. He spent 6 months at those plants and returned to the Coshocton Iron Co. where he was given charge of the foundry. One year later he joined the Black Diamond Engineering Co., Black Diamond, Pa., for 12 months and then returned as foundry superintendent at the Coshocton company. In 1913 he became assistant superintendent of the gray iron, brass and steel foundries, General Electric Co., which position he held until after the war when he joined the Herman Pneumatic Machine Co., Pittsburgh, as foundry service engineer, where he served 11 years. After a period engaged in independent foundry engineering consulting practice, he became engineer for the Fort Pitt Flask Equipment Co., Pittsburgh, in 1931. From 1933 to 1939 he was superintendent at the Bartlett-Hayward Co., Baltimore; and immediately prior to his present position, Mr. Miller was assistant superintendent with the Cooper-Bessemer Corp., Grove City, Pa.

♦ ♦ ♦

JAMES COOMBE has been elected president, William Powell Co., Cincinnati. With the exception of 2½ years during which time he served as captain of the artillery in the first World war, he has been associated with the company since graduation from Yale University in 1910. HARRY H. COOMBE has been elected chairman of the board of directors and treasurer of the Powell company; GEORGE E. WEITKAMP, first vice president and secretary; DAVID M. FORKER, OLIVER F. GANG, W. E. HEILIG, and E. R. NOLL, vice presidents, and W. E. MINOR JR., assistant to president.

♦ ♦ ♦

V. P. RUMELY has been elected vice president in charge of manufacturing, Crane Co., Chicago, to succeed J. H. COLLIER who was made president recently. Mr. Rumely has been works manager of the Crane Chicago plant for the past 4 years, during which he has been closely associated with Mr. Collier. Mr. Rumely was born in La Porte county, Ind., and studied mechanical engineering at Purdue University, later at the University of Wisconsin, and graduated in 1912. His first job after leaving college was in the farm implement plant of his grandfather, M. Rumely, La Porte, Ind., later known as the Advance Rumely Co. In 1914 he joined the Buick Motor Co., and in 1916 went to the Hudson Motor Co. Starting in the Hudson shops, he progressed through every stage of production management to superintendent and factory manager, the position he held when he resigned to join the Crane organization in 1937.

♦ ♦ ♦

EDWIN S. ARMSTRONG recently has been appointed general superintendent, Wisconsin Gray Iron Foundry Co., Milwaukee. Mr. Armstrong was born in Racine, Wis., and served his apprenticeship in his father's foundry, working his way through all departments. In 1917 he left to accept a position as assistant superintendent, Fairbanks, Morse, & Co., Beloit,

(*Continued on page* 70)

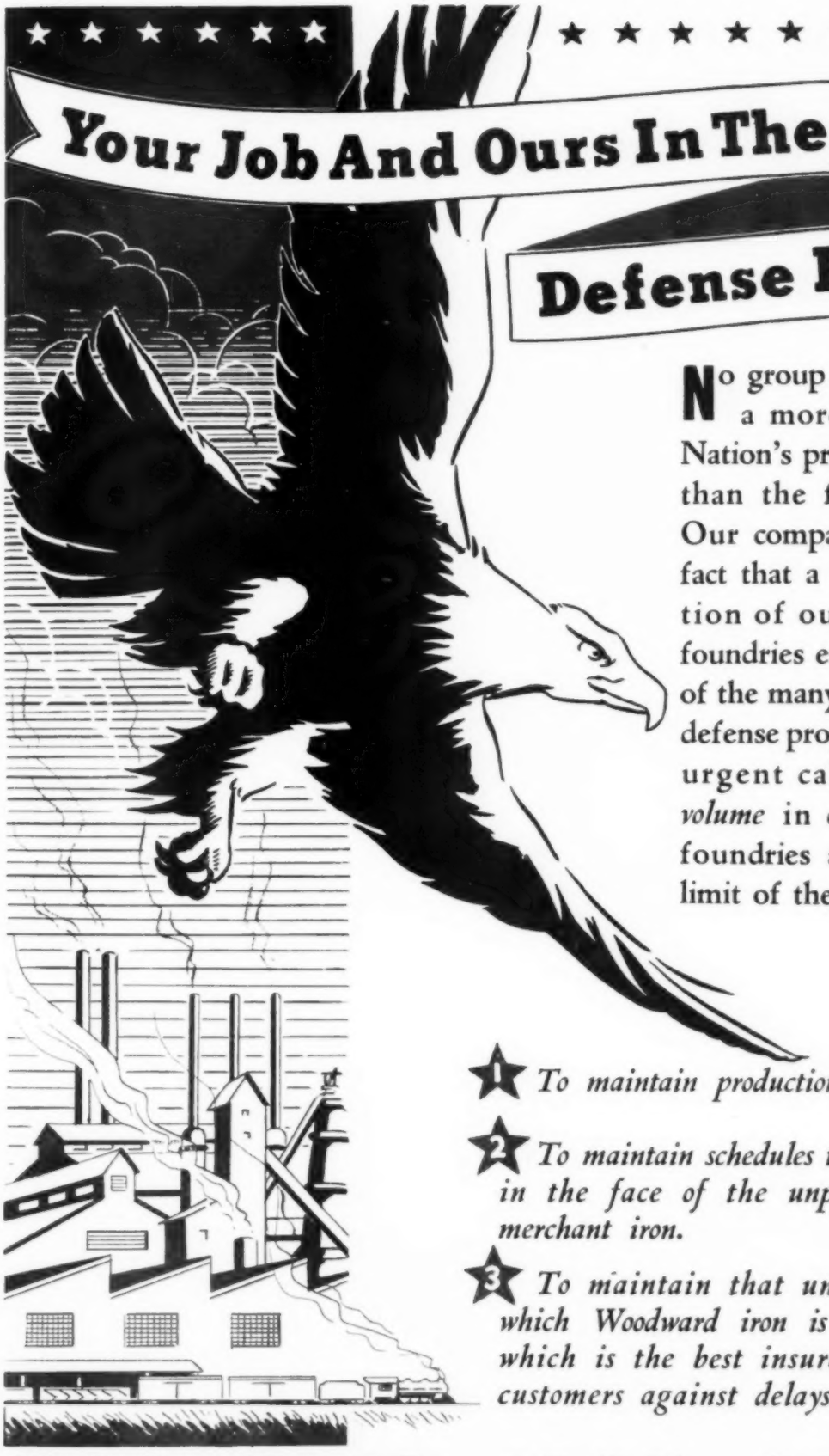
George M. Covey

C. W. Miller

James Coombe

V. P. Rumely

Your Job And Ours In The Nation's Defense Program



No group of industries is playing a more potent part in our Nation's program of preparedness than the foundries of America. Our company takes pride in the fact that a very considerable portion of our output is going to foundries engaged in one or more of the many phases of our Nation's defense program. To our country's urgent call for *more speed, more volume* in defense production, foundries are responding to the limit of their resources. So, too, are we at Woodward bending our every effort—

1. *To maintain production at peak capacity.*
2. *To maintain schedules to the best of our ability in the face of the unprecedented demand for merchant iron.*
3. *To maintain that uniformity in quality for which Woodward iron is so widely known and which is the best insurance we can give our customers against delays in foundry operations.*

WOODWARD IRON COMPANY

WOODWARD, ALABAMA

America's Largest Completely Integrated and Entirely Independent Merchant Iron Producer

INDEPENDENT SINCE 1883

(*Continued from page* 68)

Wis., and later held similar positions at Shaw Crane division, Manning, Maxwell & Moore Inc., Muskegon, Mich., Studebaker Corp., South Bend, Inc. and the Milwaukee foundry of International Harvester Co.

* * *

NORMAN F. TISDALE, Molybdenum Corp. of America, Pittsburgh, has been nominated for national trustee, American Society for Metals.

* * *

DR. C. F. RASSWEILER has been appointed director of research, Johns-Manville Corp., New York. He formerly was director of the Philadelphia laboratory of E. I. du Pont de Nemours.

* * *

R. J. LINDQUIST, for many years chief auditor, Reconstruction Finance Corp., Washington, has been elected vice president and a director, Reynolds Metals Co., Richmond, Va.

* * *

W. D. JAMES, president and general manager of the James Mfg. Co., Ft. Atkinson, Wis., has been elected president, Wisconsin Manufacturers Association.

* * *

GEORGE W. DOLAN has been elected executive vice president, Mathieson Alkali Works, New York, and J. V. JOYCE, comptroller, has been elected vice president and comptroller.

* * *

C. B. STANSBURY, formerly co-manager of Granberry & Co., Louisville, Ky., has joined the Reynolds Metals Co., Louisville as an executive in the firm's sales promotions department.

* * *

LEE H. HILL recently was elected vice president, Allis-Chalmers Mfg. Co., Milwaukee, and will head the newly created industrial relations department. Mr. Hill is a graduate of Cornell and formerly was assistant manager of the Allis-Chalmers electrical department. In his new position he will be in charge of all subjects which bear on management-employe relations.

* * *

J. M. HOWELL has been appointed manager, Schenectady works, General Electric Co., Schenectady, N. Y. Mr. Howell succeeds E. D. SPICER who has been advanced to the post of assistant to the vice president in charge of manufacturing.

* * *

JOHN A. FELLOWS, formerly foundry metallurgist, American Manganese Steel division, Chicago Heights, Ill., has been promoted to assistant chief metallurgist, metallurgical department, American Brake Shoe & Foundry Co., Mahwah, N. J.

* * *

RAY J. THOMPSON, Eastern district manager, Ampco Metal, Inc., Milwaukee, has changed his address to 57 White avenue, West Hartford, Conn. Mr. Thompson supervises field offices of the Ampco company at Springfield, Mass., New York, Philadelphia, and Washington.

* * *

LOUIS N. HUNTER, manager of research, National Radiator Co., Johnstown, Pa., has been elected a vice president of the company. Mr. Hunter joined the firm in 1930. In addition to his new post, he will continue in charge of research activities.

* * *

R. C. ADAMS has joined W. H. Bixby Inc., Des Moines, Iowa, in a sales engineering capacity. He will handle the products of Cochrane Corp., C. O. Bartlett & Snow Co., Diamond Power Specialty Corp., Hays Corp., Detroit Stoker Co., and A. P. Green Fire Brick Co.

* * *

P. V. MARTIN, associated with Carnegie-Illinois Steel Corp. 26 years, the past two years as assistant divisional superintendent of coke plant, blast furnaces and docks, Gary works, has been promoted to superintendent of blast furnaces, Gary works, succeeding the late W. H. Geesman. Mr. Martin is a member of the American Foundrymen's Association and served on the general committee of the Chicago Chapter when the annual A. F. A. convention and exhibition was held in Chicago in 1940. He also is a member of the pig iron and ferroalloys committee, American Iron and Steel Institute, Blast Furnace and Coke Association, Chicago district, and the American Institute of Mining and Metallurgical Engineers.

* * *

J. B. CHINN, recently has been appointed Birmingham, Ala., representative of Hickman, Williams & Co., Cincinnati, succeeding JOHN K. TRAVIS, who has been appointed Birmingham representative of the Philip W. Frieder Co., Cleveland.

* * *

LAURENCE M. EWELL has been appointed general manager of eastern division operations, Link-Belt Co., Chicago, with headquarters in Philadelphia. CARL A. WOERWAG succeeds Mr. Ewell as export manager and manager of the company's New York office.

* * *

WILLIAM P. HEMPHILL, senior partner of the management engineering firm, McKinsey-Kearney & Co., Chicago, has been elected president, Laclede Christy Clay Products Co., St. Louis, succeeding W. J. WESTPHALEN, resigned. Prior to his connection with the McKinsey firm in 1929, Mr. Hemphill was vice president of Armour & Co., having been with that corporation for more than 20 years. He is also vice chairman, Borg-Warner Corp., and director of a number of other companies including E. H. Scott Radio Co., Harris Bros. Co., and Wood Bros. Construction Co.

* * *

E. J. HERGENROETHER, formerly metallurgist in the development and research division, International Nickel Co., has been appointed to the staff of the conservation section, production division, Office of Production Management. Other appoint-

(*Concluded on page* 72)

Peter V. Martin

William P. Hemphill

Norman F. Tisdale

Lee H. Hill

HOW TO MAKE A tiger

PURR LIKE A kitten

A FOUNDRY had a customer the boys called "THE TIGER," and we'll let you guess why. After Truline* Binder was put in the core room, they had him purring like a KITTEN because he was getting good castings—fast.

Convenient-size Bag Is Easy to Handle

It just goes to show what Truline Binder will do in the core room. Increased oven output and more speed mean closer meeting of delivery dates. Smooth, strong cores made with Truline Binder bake through quickly—collapse quickly—and that means smooth, easy-to-clean castings.

So pin the coupon to your letterhead *and mail it today.* We'll see that you get a sample of Truline Binder and facts on how to use it to make more and better castings.

HOW TRULINE BINDER INCREASES PRODUCTION IN MANY FOUNDRIES

SAVES TIME ON BAKING Truline Binder bakes through quickly—increasing core oven output. Time saving is sometimes as much as 30%.

SAVES TIME ON CLEANING Cores collapse quickly; this makes cleaning faster. Some foundries have cut cleaning time 50% with Truline Binder.

SAVES TIME ON RAMMING Flowability of Truline Binder mix speeds ramming, particularly in green sand facings.

*Reg. U. S. Pat. Off., by Hercules Powder Co.

TRULINE BINDER

Reg. U. S. Pat. Off.

NAVAL STORES DEPARTMENT

HERCULES POWDER COMPANY

Incorporated

WILMINGTON, DELAWARE

CHICAGO NEW YORK ST. LOUIS SALT LAKE CITY SAN FRANCISCO

HERCULES POWDER COMPANY
999 Market Street, Wilmington, Delaware

Please send information about Truline Binder ☐

Please send a free trial sample ☐

Name.....

Company.....

Street.....

City.....State.....

JJ-40

(*Concluded from page 70*)

ments include: FRANK AYER, consulting engineer, Roan Antelope Copper Mines Ltd., and Mufulira Copper Mines Ltd.; and JAMES S. EARLE, formerly assistant metallurgist, Federated Metals division, American Smelting & Refining Co.

♦ ♦ ♦

FRANK W. LITTLEFORD has been appointed chief metallurgist, Oliver Farm Equipment Co., Charles City, Iowa.

♦ ♦ ♦

H. H. BLEAKNEY has been appointed chief metallurgist of the newly formed Federal Foundries & Steel Co., London, Ont.

♦ ♦ ♦

VANCE FERGUSON, formerly of the research laboratory, American Steel Foundries, has been appointed assistant chief chemist, Granite City plant.

♦ ♦ ♦

ARTHUR J. SILORA has been transferred from assistant metallurgist and foundry technician for Wright Aeronautical Corp., to director of laboratories, Cincinnati division.

♦ ♦ ♦

R. D. YODER has been transferred from the Milwaukee headquarters of Cutler-Hammer, Inc., to the firm's Cincinnati office.

♦ ♦ ♦

DONALD LAPENTA, formerly with Unitcast Co., Toledo, O., has joined the Commerce Pattern Foundry & Machine Co., Detroit, as metallurgist.

♦ ♦ ♦

C. S. MCMATH recently has been appointed a sales representative of the E. J. Woodison Co., Detroit. His territory will include western Pennsylvania and New York states, with headquarters at Buffalo.

♦ ♦ ♦

W. L. SCHNEIDER has been appointed vice president of sales, Falk Corp., Milwaukee. T. F. SCANNELL has been appointed sales manager, and J. B. KELLEY, assistant sales manager.

♦ ♦ ♦

RALPH M. HOFFMAN has been elected a vice president, Link-Belt Co., Chicago, Mr. Hoffman, graduated as a mechanical engineer from the University of Minnesota, 1911, has been assistant to the president since January, 1940.

♦ ♦ ♦

WALTER NUTTALL recently has been appointed general purchasing agent for the entire organization of the Blaw-Knox Co., with offices in the Farmers Bank building, Pittsburgh. J. E. MCWILLIAMS has been appointed division purchasing agent, Blaw-Knox division, with offices at Blawnox, Pa.

♦ ♦ ♦

F. F. SEAMAN, general manager, Robbins & Myers Inc., hoist and crane division, Springfield, O., recently was elected chairman, Electric Hoist Manufacturers Association, New York, succeeding H. S. STROUSE, Harnischfeger Corp., Milwaukee. A. S. WATSON, vice president, Detroit Hoist & Machine Co., Detroit, was elected vice chairman.

♦ ♦ ♦

AUBREY J. GRINDLE recently has returned to the pulverizer department, Whiting Corp., Harvey, Ill. Mr. Grindle pioneered the successful application of pulverized coal in firing malleable iron melting furnaces, annealing ovens, and other metallurgical furnaces over 25 years ago, and has had extensive experience in the design and operation of equipment

Aubrey J. Grindle

for pulverizing fuels for various purposes, also pulverizers for fine grinding of miscellaneous materials.

♦ ♦ ♦

R. M. CLEVELAND, has been appointed manager, Boston office of the Worthington Pump & Machinery Corp., Harrison, N. J. Mr. Cleveland succeeds W. A. FINN who has been called to active duty with the Navy in the rank of lieutenant.

♦ ♦ ♦

JESSE J. RICKS recently has been elected chairman of the board of directors, Union Carbide & Carbon Corp., New York, BENJAMIN O'SHEA, formerly vice president was elected president to succeed Mr. Ricks. JAMES A. RAFFERTY, a vice president, was elected to the board of directors to fill the vacancy caused by the resignation of MATTHEW J. CARNEY, and ROBERT W. WHITE, secretary-treasurer, was made a vice president as well.

♦ ♦ ♦

THOMAS I. CURTIN, president and treasurer, Waltham Foundry Co., Waltham, Mass., was accorded recognition at the research day program given by the Waltham Chamber of Commerce. Included in the citation awarded to Mr. Curtin was the following: "By laboratory study, considerations for formulas, plus an ability resulting from a lifetime of work in his chosen field, Thomas I. Curtin in his Waltham foundry has produced gray iron castings noted for their fineness of quality and endurance."

♦ ♦ ♦

JOHN P. ARNOLDY has been elected president, Warman Steel Casting Co., Los Angeles, succeeding the late Charles J. Wild. Mr. Arnoldy joined the company in 1917, and became secretary in 1923. In 1924 he was elected general manager, which position he still retains. FLORENCE D. WILD has been elected treasurer and continues as vice president. WILLIAM P. MCGERVEY JR. has been elected secretary to replace Mr. Arnoldy. He was also named assistant general manager.

♦ ♦ ♦

C. L. WARWICK, secretary, American Society for Testing Materials, has been appointed to the conservation unit of the production division, Office of Production Management. The work of that unit is the conservation of materials necessary to defense in non-government production.

♦ ♦ ♦

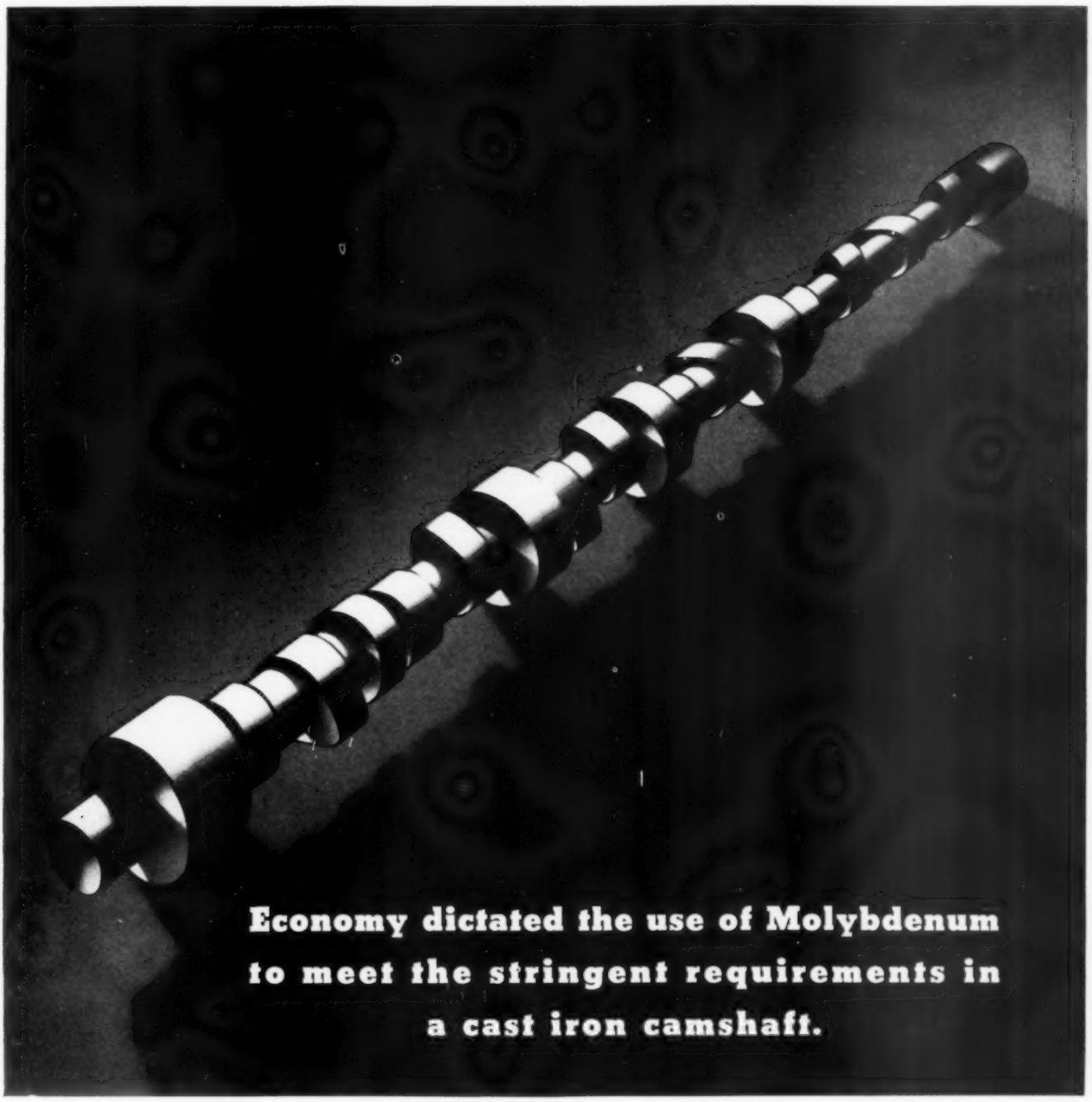
GEORGE A. RENARD, executive secretary, National Association of Purchasing Agents, has been named liaison officer between the division of purchases and the Office of Price Administration and Civilian Supply.

♦ ♦ ♦

C. W. BERQUIST, for 13 years superintendent of public relations, Hawthorne works, Western Electric Co., Chicago, has been appointed manager of the company's newly organized division of industrial and personnel relations. The new department consolidates the functions of industrial relations, public relations and personnel management. A. P. LANCASTER, division head of public relations, has been appointed superintendent of industrial relations, and E. J. SKITT, division head of personnel placement, has been named superintendent of personnel service.

♦ ♦ ♦

JAMES H. MAGUIRE has retired from active duty as works manager, Haynes Stellite Co., Kokomo, Ind., but will continue with the company in a consulting capacity. F. T. MCCURDY has been appointed general superintendent in charge of production and operating departments. Mr. McCurdy has served as superintendent of the plant since 1929. J. R. BROWN, formerly production manager will be assistant superintendent. HILLARD C. FRETZ, formerly general foundry foreman, has been appointed assistant to the superintendent and will be in charge of foundries. Mr. Fretz received a bachelor of science degree in chemical engineering from Purdue University in 1921.



The automotive industry requires certain minimum physicals, plus wear resistant properties, to make practical a cast iron camshaft. Machinability also, of course, is a factor.

The Chromium-Molybdenum-Nickel (0.40-0.60% Mo) iron which resulted from the search for the ideal, has an as cast tensile strength of 50,000 p.s.i., is rigid enough for the requirements and tough enough to stand up under the operating conditions.

The analysis of the iron makes possible economical, efficient flame hardening of the cams, with a good, strong case to core bond.

Ask for our free technical book, "Molybdenum in Cast Iron", giving full practical data.

CLIMAX FURNISHES AUTHORITATIVE ENGINEERING DATA ON MOLYBDENUM APPLICATIONS. MOLYBDIC OXIDE BRIQUETTES FOR THE CUPOLA—FERROMOLYBDENUM FOR THE LADLE

Climax Mo-lyb-den-um Company
500 Fifth Avenue · New York City

MOLY

THE ADVENTURES OF BILL

BY PAT DWYER Drawings By RICHEY

HOW would you like," Bill inquired the other night, "to join a small and strictly select association organized for the purpose of insulting people? To swagger through life like them there three buckaroos in jack boots and plumed hats—you know the fellas I mean, Athos, Aramis and the big, black bully Porthos—who used to prowl around Paris and France and other foreign parts. Whenever they felt the urge for a little pleasure they stepped on the toes, literally or figuratively of friend or stranger. If the offended one squalled in agony or protest, the stepper-oner languidly curled his moustache with the thumb, first and second digits of the left hand, whipped a long, glittering blade to the victim's throat with the other hand and coldly inquired if he wanted to make something out of it. I never read the book, but I seen the pitcher one time a good many years ago and why they call it the Three Musqueteers I never have been able to figure out. Not one of the birds carried a gun—"

"Wait a minute," I protested. "You ask me a more or less hypothetical question about joining a more or less hypothetical association. Then without any warning, you jump to a consideration of certain technical detail in the famous old romance written by Dumas *pere*—"

"What do you mean, pair? Was there two of 'em doubled up on the job, or did Brother Doomaw just have a helper?"

"According to all accounts he had all kinds of helpers. The old boy just laid down the pattern, finished the job and set the cores. The helpers rammed the sand, lifted the flasks and did all the rough work. In that way he hung up several records in the number of stories produced over his by line."

"Well," said Bill, "we learn something every day. I thought the system of working a buck was invented in the American stove plate business. The molder's union raised—well, let us say the molder's union did not care much for the practice. I remember one time in St. Louis—"

"All old stuff," I said, "water over the dam or under the bridge, or wherever spent or flowing water disappears. Let it go. Comparative peace has reigned in the American stove plate industry for many years. What about the insulting society?"

"Well," said Bill, "I'll tell you. The last day of the convention in New York I was strolling through the hotel lobby when three lads came along arm in arm. If I had not hopped nimbly to one side I believe they would have tramped right over me. Naturally I asked for an explanation of these here now hostile tactics on the part of fellas I have known for many years and always regarded as good friends.

Pilgrim lured by Temptation

"The gabbiest member of the trio put up the dukes in approved professional style and volunteered the information that himself and the other two scowling members craved a little excitement. Here the convention had been running four days and everything was as calm and peaceful as an old time cake and ice cream festival on the front lawn of the sunday school superintendent. Since the chances for a row, a riot, a fire or a visit from a police squad were growing more remote hour by hour, the three lads decided to stir things up a little.

"One of the boys complained that the general atmosphere made him slightly ill. Every one bowing, smiling, shaking hands and using nothing but Class *A* words. With elegantly dressed women all over the place, in the lobby, the corridors and popping out of the wood work unexpectedly, what chance did a man have to express an honest foundry opinion about anything? Every meeting room was equipped with a table and chairs, a pitcher of water for the speaker and chairman and a lantern for throwing the most fearful and wonderful illustrations on the screen, but out of the entire list of meeting rooms, only one was equipped with cuspidors! As man to man this bird wanted to know if that was a way to run a convention.

"Consulting his boon companions on the subject he was highly gratified to find them charmingly receptive to his suggestion that what the convention needed was a little rough stuff, a dash of the real old foundry atmosphere to offset the peace and harmony, politeness, good manners and other sickening observance of Emily Post's book of instruction of how to eat, sleep, dress, drink and how to conduct ourselves in the presence of (a) superiors (b) inferiors and (c) equals—if any.

"Several highly meritorious schemes were proposed. Finally they settled on this here now general insulting idea as the most likely to bring immediate action. I admitted that the general aim and object of the new society appealed to me, but before I signed on as a member, I should like to hear how the work was to be conducted. Also it seemed to me that a reasonable degree of discretion should be observed in picking out the insultees. A highly embarrassing situation might arise if a victim turned out to be a professional pugilist, wrestler or local strong man with a touchy disposition, a dose of dyspepsia and some of the more notable

(*Continued on page* 76)

AMERICAN MONORAIL

Increases Plant Capacity

Handling service furnished by American MonoRail interrelated cranes over the nation's largest aircraft assembly floor—plant of The Glenn L. Martin Company.

BEFORE YOU EXPAND *Explore* **AMERICAN MONORAIL**

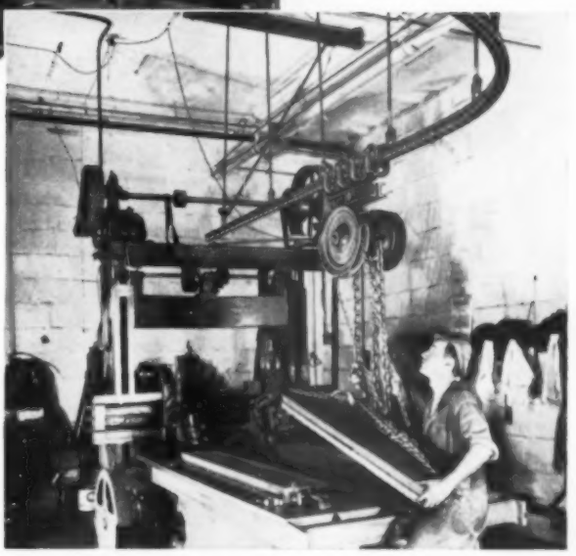
EVERY day more plants are adding capacity by putting their floor space to better use—by putting carrying jobs **overhead** with American MonoRail.

They find that materials and products are thus kept on scheduled routes—no congestion, no damage in transit.

The men, too, relieved from lifting and carrying, give full time and skill to production and accomplish more.

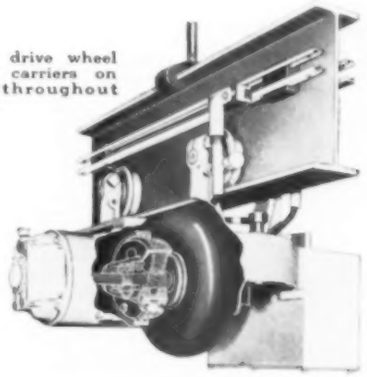
Since standard parts are assembled into complete systems to meet the special requirements of the particular job, the cost of American MonoRail is surprisingly moderate. Operation and maintenance are a minimum. Supplied for manual, electric or automatic operation.

Let us arrange for an American MonoRail engineer to survey your requirements at no obligation.



Easy placing of heavy die blocks in planer with no damage to dies or machinery.

Rubber drive wheel propels carriers on cranes throughout system.



Write for copy of "Blue Book" showing hundreds of installations.

THE AMERICAN MONORAIL CO.

13104 ATHENS AVENUE **CLEVELAND, OHIO**

(*Continued from page* 74)
attributes of a hungry wild cat equipped with a set of abscessed teeth.

"I was assured the program was quite simple. For example take a look at an old sour puss crab sitting in a heavily upholstered chair.

" 'We shall approach this blot on the landscape,' one of the heroes informed me, 'and draw up in front in military formation. No. 1 shall step on his toes. When he leans forward to examine the damage, No. 2 hits him a shrewd belt on the nose, delivered with great force and vigor. Calmly ignoring his yell of anger and pain, we shall proceed down the line interrupting conversations, pushing people to one side and in a general way having a high old time. Do you want to come in?' "

" 'Pon my word," I interrupted Bill at this point, "you certainly have a noble gift in picking out the Good Companions. I trust you frowned heavily on the program and did your best to turn the thoughts of these rough necks into more peaceful channels. Sweetness and light and —er —ah —all that kind of thing."

"Sweetness and light my left hand big toe. The whole thing was a plant designed to horrify and alarm me to the ultimate yield point. Forty years ago the program would have been considered a positive flash of genius. Today, the three lads would no more think of taking it up than they would think of parading down town in a breech clout, safety pin and high hat. With a mop of white hair and a ruddy face, one of the boys easily might pass for a bishop. His language was heavily impregnated with references to the Deity and other ecclesiastical items, but close attention to the context would show that his familiarity with the subject smacked more of the foundry than of the Sunday school. The second lad, tall, imposing and dignified is a model of propriety in his home town. I have been told—but I think that imposes too great a strain on one's credulity—I have been told that on Sunday he wears a long tail coat and striped trousers and takes up the collection at high mass. The third member of this precious trio is prominently identified with various financial and civic activities, an alderman if you please and a member of school, park, hospital and library boards.

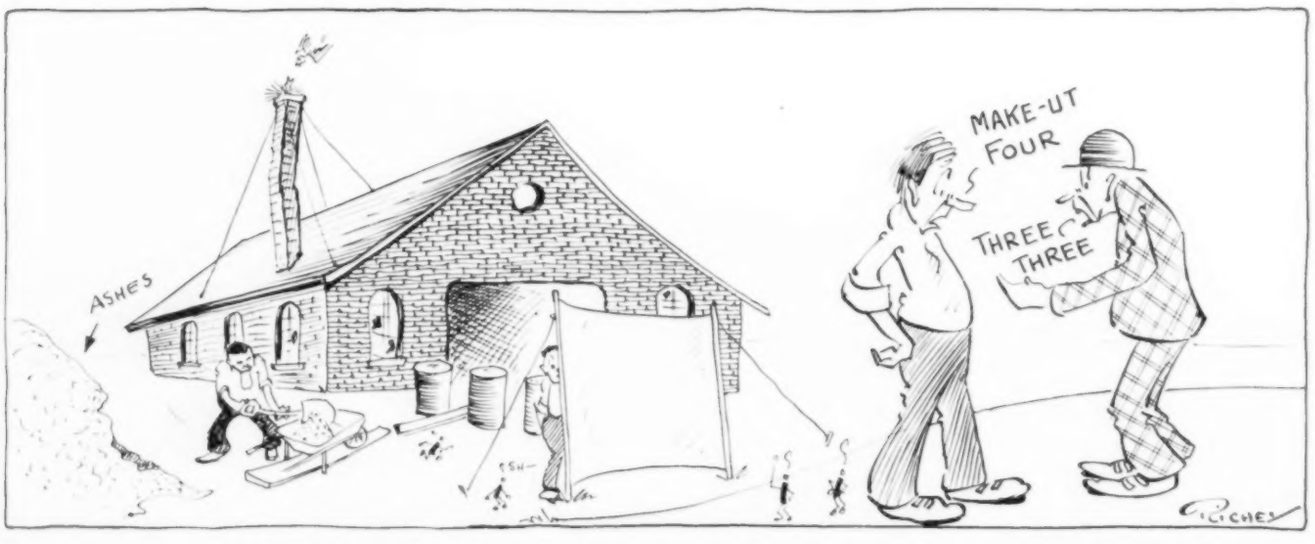
"All solid, substantial citizens engaged for the greater part of the time in the routine duties connected with responsible positions. In moments of relaxation their favorite reminiscences are connected with the days when as carefree young molders they rambled all over the country, taking their fun where they found it and as careless for the future as the birds of the air or the lilies of the field, consider how they grow and all that kind of stuff. Remember the old song? These were the happy golden years when I was in my prime. The lasses took delight in me I was so neat and fine. I roamed about from fair to fair, likewise from town to town, and then I married me a wife and the world turned upside down! Well, that's them. And boy them was the days.

"We spent a hilarious hour discussing events that happened. Events that might have happened and events that never happened, but which are more attractive than any of the others. Apropos of a nonferrous session we had attended earlier in the day, one lad asked the other if he ever had told me of the time he ran a small brass foundry in Jersey City. I hastily assured him that was a chapter in his miss-spent life I had missed. For one reason or another, not necessary to explain, I can't use all the words. The following is fairly close to the original:

" 'When I was a young punk a year or two out of my time I blows into Joisy City and I meets a bimbo in One-Eye Joe's place. He runs a little foundry down near the dock and he wants a molder. Most of his stuff is small, but he lands a job for a propellor and he ain't got a plug in the shop knows anything about them kind of jobs. He asks me if I can make a propellor and of course I tells him I can make anything that will go in a flast or in a pit. When payday comes he hands me $5 and explains he is a little short, collections is slow and all that kind of baloney. He would fix things up in a short time. I worked for him three or four weeks and all I ever got out of him was 3 or 4 dollars at a time. Finally I backs him into a corner and threatens to shove him head first into one of the furnaces if he did not come across. He yelps a bit when I loosened my fingers and at last he tells me to take the shop instead of the wages and I never seen him afterward.

" 'Among the jobs I had was an order for a couple of hundred brass crosses for a New York firm that catered to the church and funeral trade. Rag Time Jimmy made 'em two in a flast, but I began to notice that the shipping count never agreed with the gangway count. One night in Red Mulcahy's Shamrock Bar and Cafe, the bar tender told me that the night before Rag Time was in there with a basket of crosses which he claimed had been sent to him from his father in Ireland. Specially blessed they were by the Arch Bishop of Tuam and while they lasted he would let them go for a dollar and a half apiece, and mind you, only one to an applicant. He must have

(*Concluded on page* 122)



Bret Harte's well known Heathen Chinee has no monopoly on ways that are dark and tricks that are vain

EXACTLY, MR. GRANT; BUT WE SIMPLY MUST PREPARE FOR IT, REGARDLESS

The doughty general who correctly classified war, regarded armed conflict as a brutal waste; but he would have been the last man in the world to waver under the responsibility of prosecuting it. Our long experience in planning and engineering core ovens was calculated to promote the arts of peace, but our skill has been brought to the attention of the government. Since the first of the year we have engineered and sold 57 of our units to the United States Government in the interests of the national defense program. This official recognition of our ability is not lightly dismissed. Ovens that are planned and engineered by us result in better and quicker production at reduced cost. Better castings, fewer rejects, increased output, more even heat distribution with less fuel: all these things are brought about through the use of YOUNG BROTHERS engineered core ovens. Ask our engineers about YOUR problems concerning core ovens.

YB Co

YOUNG BROTHERS COMPANY

35 YEARS EXPERIENCE BUILDING

Industrial Ovens

FOR ALL PURPOSES

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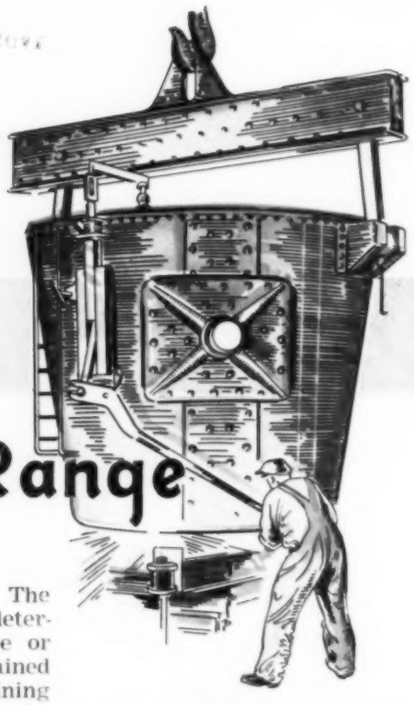
Foundry DEVELOPMENTS At Short Range



A NEW type of electric gage for measuring the wall thickness of hollow, aluminum airplane propellers recently has been designed, and it is applicable to any nonmagnetic metal or alloy when only one side is accessible, even if the alloy is backed by a magnetic metal. Thicknesses up to 1½ inches, depending upon the electrical resistivity can be measured within an accuracy of 5 per cent.

* * *

Tests have been conducted which are claimed to demonstrate conclusively that magnesium alloys can be heat treated satisfactorily at temperatures as high as 800 degrees Fahr. in typical convection type, gas-fired furnaces, if a small percentage of sulphur dioxide is added to the convection gases. Amount of the latter gas required is only enough to produce an acidic atmosphere.

* * *

Presence of phosphorus in steel and cast iron can be determined by a new colorimetric method developed by the Bureau of Standards. The method worked out by John L. Hague and Harry A. Bright of the bureau's chemistry division centers on use of rapid colorimetric or turbidimetric procedure, a step which was conceived after the recent improvements in filter photometers. Use is made of the phosphomolybdenum-blue reaction employed for many years in biochemical work. The sample of steel is dissolved in dilute nitric acid and the phosphorus is converted to the ortho acid by fuming with perchloric acid. The interference of iron is avoided by reducing it to the ferrous ion with sodium sulphite. The phosphate ion is then converted to the "blue compound" by adding a solution containing hydrazine sulphate and ammonium molybdate and heating at 90 degrees Cent. for about 5 minutes. The transmittancy of the colored solution is measured with a photoelectric colorimeter and a Corning "Lantern Shade Yellow" filter. The quantity of phosphorus is determined from a standard curve or table prepared from data obtained from treating steels containing known amounts of phosphorus in the same manner as was used for the unknown.

* * *

A recently developed material is claimed to prevent corrosion and disintegration of metal parts exposed to gaseous atmospheres at furnace temperatures. The material which is applied as a liquid coating withstands heat in excess of 1500 degrees Fahr., prevents oxidation, and keeps the metal parts sound and clean.

* * *

In one foundry where the brass castings were softer than the usual run, and difficulty was encountered from abrasive cleaning in that cutting tools used in finishing operations had an extremely short life, the trouble was eliminated in a simple fashion. Press turnings from the machine shop were employed as the abrasive, and surprisingly enough it was found that cleaning time was practically as good as it had been with metallic abrasives.

* * *

THE man in the foundry charged with the responsibility of determining the cause of scrap losses should be familiar with molding and coremaking so that he can attribute the faults correctly. Since there are at least 30 different causes responsible for defective castings, it is obvious that they should be known and understood by the checker.

* * *

A recent investigation in Europe on the application of glycerine as an ingredient of quenching and tempering media indicates that glycerine and water mixtures are suitable in the region between oil quenching and water quenching for steel. The higher the ratio of glycerine to water, the milder the quench. No dirt and other deposits are said to be formed on the metal, and traces of glycerine can be washed off easily. To produce steel with high elasticity and hardness glycerine should be the major constituent of the bath. Elasticity is enhanced by addition of 0.25 to 4 per cent potassium or manganese sulphate. Further additions of 1 to 2 per cent potassium or manganese chloride also aid those properties. Acrolein, the thermal decomposition product of glycerine, is claimed not to be formed if water is present in the quenching medium.

* * *

SHORT pieces of split and cut old rubber tires or small wooden blocks mixed with a load of fragile castings will break the fall of the work in blast cleaning mills, and also reduce abrasive wear on the machine. Fragile pieces can be wired in bundles and cleaned.

* * *

An aluminum alloy which is used in Germany for intricate or highly stressed parts to be made as sand castings contains 4 to 6 per cent zinc, 2 to 4 per cent copper less than 0.1 per cent tin, less than 1.5 per cent silicon, less than 1 per cent iron, less than 0.2 per cent magnesium, less than 0.4 per cent manganese, less than 0.3 per cent lead and less than 0.3 per cent nickel. A similar alloy which may be used for either permanent mold or sand casting contains less than 2.5 per cent zinc and 6 to 8 per cent copper.

* * *

Often it is possible to eliminate the need for an addition to the foundry by a careful survey of the present layout, and then rearranging the equipment to obtain the most efficient use of the floor area. In some cases it may only require replacement of antiquated devices by modern equipment.

By A. H. ALLEN
Detroit Editor, The Foundry

AMONG DETROIT FOUNDRIES

VIRTUAL stoppage of the flow of scrap aluminum to secondary smelters, together with the recent OPM order that all aluminum scrap must be applied to work with preference rating of A-10 or higher, has brought the matter of cast iron pistons for automobiles again sharply into focus. With a B-4 rating, automobile companies now realize they will have no aluminum for pistons, hence must proceed with the change to cast iron. Buick, Olds, Cadillac, Chrysler, Dodge, Plymouth, De Soto, Packard, Hudson, Studebaker and Nash all are faced with an immediate switch to iron.

Naturally, this emergency has been anticipated. Foundry layouts have been prepared, equipment has been ordered, canceled and reordered. Buick apparently will make its own pistons, and possibly those of Olds and Cadillac, in its foundry at Flint and reports indicate decision has been reached to use dry sand cores on the job, in contrast to the green sand method used at Chevrolet Gray Iron division where pistons for Chevrolet and Pontiac are produced.

Use Dry Sand Cores

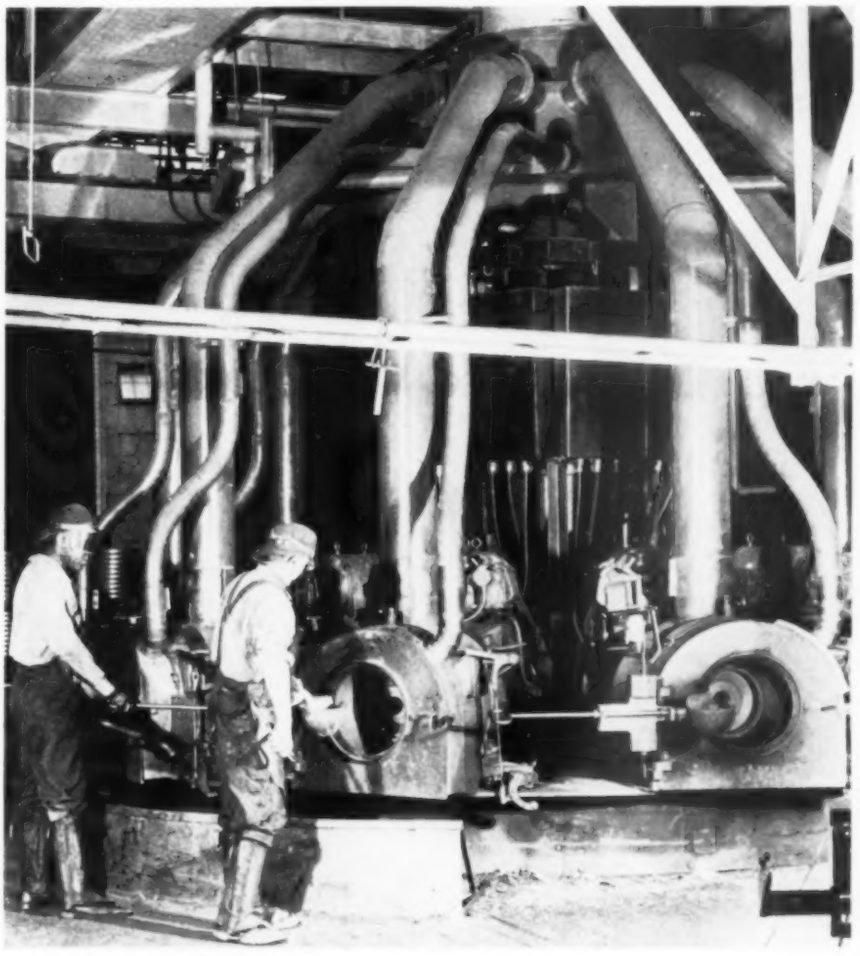
Dry sand cores are considerably more expensive but are said to be dictated by the Buick piston design. Produced on coreblowing machines, the cores will be made in gangs so that pistons can be cast ten in a mold. Cost of cores is understood to approximate 2 cents each by the method proposed.

Chrysler has developed a foundry layout calling for expenditure of $500,000 for piston production, but at the middle of last month had made no decision on whether to proceed with the project. The job either could be placed in the Dodge foundry in Detroit or in a completely new plant. In the former case it would be necessary to remove some present casting jobs from the Dodge lines to make room for pistons.

The only difficulty with building a new foundry for piston production is that the change to cast iron is not considered a permanent matter, but only a stopgap to meet the current shortage of aluminum which may be corrected or alleviated by the time the next year's models are due. Expenditure of half a million cannot easily be written off in one year's time, so Chrysler may decide to farm out piston production. Lakey Foundry & Machine Co. at Muskegon and Electric Auto-Lite foundry at Fostoria, O., are mentioned as two possible sources.

What the rest will do is anyone's guess. Packard Nash and Studebaker operate their own iron foundries, but the economic feasibility of setting up to produce pistons is problematical in view of their comparatively low production rates.

The possibility of the "big three" car producers helping out the independents on piston requirements is suggested and may not be so unthinkable as it sounds. The large producers have no wish to see their smaller competitors go to the wall, believing that competition keeps the industry healthy. Conceivably General Motors might undertake to supply, say, Packard and Nash with cast iron pistons for the duration of the



One of the centrifugal casting "merry-go-rounds" now in operation at the Buick foundry in Flint for production of brake drums. Operator is pouring iron into the small spoon mounted on the front of each "spinner" which is swung around into the chamber and the contents discharged into the spinning mold. Note the network of exhaust lines for removal of gas and fumes

emergency. Practically complete elimination of zinc from motor car usage, occasioned by diversion of a large amount of zinc production to a defense pool and allocation of what is left to nondefense users by the OPACS also hits the motor industry hard.

There is one important point which has escaped the attention of defense officials in their activities to date. Just this: If nondefense industrial activity is to be shut down arbitrarily, without regard to the effect on employment, available materials, equipment or anything else, among other things, it is going to throw thousands of men out of jobs needlessly and is going to push the cost of defense items sky high, because then defense manufacturing will have to absorb all overhead instead of only a part of it as at present.

Change in the Offing

To return to the matter of zinc, auto companies are now in process of tooling up for changing carburetors from zinc die castings to cast iron. Machining costs will be double, extra demands will be made on equipment and tooling, as well as on the services of skilled layout men and tool engineers. Some observers are convinced that a calm, studied analysis of zinc supply and demand by persons familiar with it would result in sufficient zinc being released to the auto industry to continue die cast carburetors. But such is not the case now and the change is in the offing.

Briquetting of borings and turnings for use in foundry cupolas is practiced to a greater extent in this area than in any other throughout the country. As proof, consider the fact that one builder of briquetting machines has installed 15 in plants within a 100-mile radius of Detroit, against a total of 28 in the entire country. And a half dozen or so more are on order for installation here.

Theory behind proper briquetting of this scrap material is simplified handling of scrap into the cupola as well as quicker melting of the scrap with attendant reduction in oxidation and nonuniformity of iron structures. Of course, it has been general practice for years to put borings for cupola into covered cans or to briquet them with cement, or cover with molten iron in pig molds, but by briquetting them in a press to 80-85 per cent of the density of solid iron, better melting is achieved.

An additional reason for the large number of briquetting operations hereabouts is the large supply of borings and turnings available. Even so, some are imported, Chevrolet bringing borings by boat from Tonawanda, N. Y., for briquetting at Saginaw, and even buying an occasional tonnage from Ford.

Have Disappeared from Market

Result has been that borings and turnings have just about disappeared from the scrap market, and scrap dealers have given thought to the idea of installing presses to make briquets for sale. Latest report is that Great Lakes Steel Corp. here is considering presses for briquetting turnings for charging into open hearths. Angle here is the reduction in alloy loss with use of briquets which are submerged quickly in the molten metal bath, giving no time for alloy content to oxidize and go into the slag.

Always the noisiest department of a foundry, cleaning rooms are notorious for their din and clatter which in busy times like the present reaches new crescendoes. Working an 8-hour trick in one of these "boiler shops," is a heavy toll on any workman's nerves and hearing capacity, but there appears to have been little done by foundrymen to attempt to minimize noise.

Reduce Cleaning Room Noise

Convinced that something could be done, the Monroe Steel Castings Co., Monroe, Mich., has completed installation of an acoustically treated cleaning room where the noise level is claimed to be reduced by 50 per cent. Complete details and illustrations will appear in a forthcoming issue of THE FOUNDRY. In brief, the installation includes batteries of acoustically treated booths to house chipping and grinding operations, for both large and small castings; acoustically treated walls and roof, insulation of foundations from flooring and insulation of flooring from walls and columns. Movement of castings through the department is handled entirely by roller conveyors and hoists, expediting flow of material. Even with the new facilities, the plant currently is taxed about to capacity, melting steel at a rate of about 550 tons a month.

Reports persist of a new foundry to be erected in Michigan by Campbell, Wyant & Cannon Foundry Co., ostensibly to be operated in connection with some phase of defense manufacturing, and reportedly to melt around 500 tons of steel daily.

Bids were taken last month by the war departments on 1,300,000 practice hand grenades of cast iron with minimum 25,000 pounds tensile strength.

Castings and patterns from apprentice groups all over the country displayed at New York convention

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OFFICE OF PRODUCTION MANAGEMENT EXTENDS PRIORITY CONTROL

AN ORDER bringing aluminum scrap under full priority control recently was announced by the Division of Priorities, Office of Production Management, Washington. Orders previously issued control the distribution of primary and secondary aluminum, but the new order is the first carrying general priority control of scrap. The order provides that virtually all scrap will go to defense channels except when specific directions are issued by the director of priorities to meet special emergencies.

The order states that no person after the effective date of the order, June 10, 1941, shall deliver aluminum scrap for melting or processing purposes unless such delivery has been assigned a preference rating of A-10 or higher, or unless the director of priorities has specifically authorized delivery of a nondefense order which is considered directly or indirectly in the interests of national defense.

Aluminum For Defense

Provisions of the order do not govern the sale or transfer of scrap between dealers but are intended to apply to the sale of scrap to persons who will melt or otherwise process the material.

The order states that the shortage of aluminum has increased, that more than 90 per cent of all primary and secondary aluminum produced during June was required for defense, and that an increasing percentage of the entire production of both primary and secondary aluminum will be required for defense during the rest of the year.

The new order revokes Supplementary Order M-1-b, which governed the distribution of low-grade aluminum metal.

The present status of control for aluminum, therefore, is as follows: Distribution of all aluminum in ingot form, in semiprocessed form and in fabricated form is governed by priority control, which provides that defense orders will come ahead of all other orders. Distribution of scrap by any person to any processor of such scrap is now also controlled. The orders give the Priorities Division complete control of aluminum in all forms, except for transactions between dealers.

As safeguards against diversion of metal in nonessential purposes, the order provides that persons violating the terms can be prevented from obtaining further supplies of aluminum scrap, and also provides that processors accepting deliveries of scrap shall keep complete records as to inventories, purchases, sales and deliveries.

Control of Copper

An amendment to General Preference Order M-9, which provided full priority control over copper, has been issued by the director of priorities.

The amendment includes three main changes in the order, as follows:

(1) Each refiner, in estimating the amount of copper he must set aside each month in a pool, for specific allocation, will set aside an amount equal to 20 per cent of his April production of *duty-free* copper.

(2) The amendment provides that a refiner may make full shipment to any customer in any month in which that customer's total commitments do not exceed one minimum carload lot. It is also provided that no customer's order need be cut below a minimum carload lot for one month.

(3) Restrictions governing toll agreements are liberalized. It is provided that persons who are parties to toll agreements for copper, must file information concerning such agreements but need not file full copies of such agreements and need not obtain specific permission for new agreements.

Civilian Control

Factors to be taken into consideration by the Office of Price Administration in formulating policies and programs for allocation of iron and steel products among competing civilian demands recently were announced in a "Civilian Allocation Program for Pig Iron, Ferroalloys, Steel Ingots and Castings, and All Carbon and Alloy Steel Products."

Current demand for such products under defense orders and for civilian purposes is greater than the ability of producers to deliver in the required amounts upon scheduled delivery dates, the program states. Therefore, it has become necessary, after military defense requirements are satisfied, to provide for equitable allocation of remaining iron and steel products among competing civilian demands. In doing this the administrator of OPACS will take the following factors into consideration:

1. Need to provide adequately for civilian uses essential to the public welfare.
2. Degree of hardship upon labor or business resulting from the failure to obtain deliveries when scheduled or from the rejection of orders.
3. Past rates of consumption of the products by users thereof.
4. Objective of achieving an equitable division of supplies of the products among all users.
5. Availability of substitutes for the particular uses for which the products are sought.
6. Policy of the administrator to refuse allocation to any person who, in the conduct of his business, discriminates against defense orders.

Steel Delivery

General steel preference delivery order, recently issued by the director of priorities and designed to give defense needs and essential civilian needs first call on the nation's supply of steel and steel products, includes the following:

"All producers of pig iron, ferroalloys, steel ingots and castings, and all carbon and alloy steel products shall fulfill present and future defense orders, giving preference to the same, whenever and to the extent necessary to assure deliveries under such orders in accordance with the delivery schedules provided therein.

"Deliveries of the aforesaid products by any producer thereof shall hereafter be made in accordance with any written order, supplementary order or instruction which may hereafter be issued, if and when the same are hereafter issued.

"Any customer of a producer of the aforesaid products whose deliveries thereof under any order have been unreasonably deferred by a producer, and any prospective cus-

(*Concluded on page* 86)

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(*Concluded from page* 84)

tomer of a producer of the aforesaid products whose order therefor has been rejected by such producer may file with the Division of Priorities, Office of Production Management, Washington, Report Form PD-32, duly executed and sworn to by him in the manner herein provided, setting forth the facts called for in said Report Form PD-32 in connection with such deferral or rejection.

"Upon receipt of such Report Form PD-32, duly executed and sworn, from a customer, Order Form PD-32a will be issued to the producer or producers indicated by such customer if the facts set forth by such customer justify such issuance, and thereupon within five days of the issuance of such Order Form PD-32a, the producer or producers to whom the same has been issued shall submit a sworn statement to the Division of Prorities, setting forth in detail the cause or causes for the deferral of the delivery or deliveries, or the rejection of the order or orders specified.

"Thereafter, such action will be taken and such order or orders issued as may be fitting and appropriate under the circumstances disclosed by the customer and the producer or producers in question.

"Any producer or producers of the aforesaid products to whom an Order Form PD-32a is issued, shall submit to inspection of any and all records, documents and data in connection with the delivery or deliveries, order or orders referred to in Said Order Form PD-32a by a representative of the Division of Priorities."

New Zinc Order

Zinc has been put under full priority control by the OPM.

A new order, which becomes effective July 1, provides that all defense needs shall be filled ahead of all other requirements, that an emergency pool will be created to meet urgent needs, and that the remaining zinc shall be allocated among competing civilian demands. In allocating for delivery under civilian orders, the director of priorities will be guided by a civilian allocation program when issued by the Office of Price Administration and Civilian Supply.

In the general preference order it is stated that zinc includes "all grades of metallic zinc (spelter) produced directly from ores, concentrates, and other primary material, or redistilled from scrap, including dross, skimmings and ashes; all zinc oxide both lead free and leaded; and zinc dust." Deliveries under all defense orders, which do not bear a higher preference rating are assigned a rating of A-10. Deliveries bearing lower preference ratings or no rating must be deferred if necessary to assure deliveries for defense needs. After all defense needs have been assured, deliveries to nondefense orders may be made so long as all terms of the order are complied with.

The order provides that during each month, beginning July 1, each producer of metallic zinc, zinc oxide, and zinc dust, shall set aside from his total production an amount to be determined from time to time by the director of priorities, to be delivered only upon express direction from the director. The order provides that the zinc which remains, after the required amount has been set aside in a pool, will be equitably prorated.

Users of zinc in the forms covered by the order may make special application to the director of priorities for allocations of zinc from the pool set aside each month. Such applications for special allotments will be made on forms to be prescribed by the director.

Inventory limitations are included in the order which prevent the building up of excessive and unnecessary stocks.

Many groups gathered at the New York convention of the A.F.A. Photos courtesy of Bradley H. Booth, Jackson Iron & Steel Co., Jackson, O.

COMMENT

DIFFICULTY in obtaining graphite for foundry facings and the probable need of employing less pure materials in the present emergency, have been stressed in the following communication from H. M. Riddle Jr., president, Asbury Graphite Mills, Asbury, N. J.:

> One of the critical materials used in foundries that has had very little attention from foundry management is graphite foundry facing or plumbago. The better grades come from the Island of Ceylon in the British East Indies.
>
> Since the start of the war, prices on all grades of Ceylon have advanced tremendously, some as much as 7 to 8 cents per pound. The law of supply and demand regulates these prices. Due to war conditions, the demand all over the world has increased and prices have advanced steadily. Higher ocean freight rates and war risk insurance also have their influence.
>
> It has been suggested by several of the suppliers of this material that grades of less purity be substituted, particularly in cases where 90 per cent carbon material is being used. This would also conserve the supply. Steamship space is getting very difficult to obtain due to shortage of bottoms.
>
> The Office of Production Management is considering graphite along with the other critical materials, trying to assure adequate and uninterrupted stock for this country. Due to the lack of knowledge by the general public and the comparatively small quantities used, this very useful and essential material has not received the same publicity as other essential and critical materials not readily available in the U. S. A.

—□—

A report of the Labor Division of OPM indicates employment in foundries and machine shops increased approximately 32 per cent during the past year.

—□—

MANY of the questions which were occasioned by General Metals Order No. 1, the inventory control of 16 metals, have been cleaned up in a series of interpretations and instructions recently issued by the Division of Priorities, OPM. Of particular interest to the foundry industry is the following relating to "semi-processed or premanufacturing form":

> "Semiprocessed or premanufacturing form" means any form which necessitates further processing or manufacturing before assuming the finished form in which it is to be ultimately used. An item is in finished form when it is ready for ultimate use as a separate unit.
>
> By way of illustration, items such as finished pistons, connecting rods, valves, pipe, completed eye beams, bolts, wire spikes, etc., are considered as being in finished form and not in semiprocessed or premanufacturing form, and therefore, not within the terms of said order, regardless of the further incorporation in other assemblies, or as parts of other finished products, necessary to make them practically available for ultimate use.

—□—

QUITE frequently I have mentioned the need for elimination of waste through the standardization of parts. Manufacturers of wood screws recently pointed to what might be accomplished when through conference and agreement, it was possible to eliminate 507 sizes out of a total of 885 sizes, or 57 per cent. However, the 57 per cent of the total number accounted for only 3.87 per cent of the sales of that industry.

—□—

SHORTAGES of metals provide a serious handicap to the foundry industry, and, according to some, a decided break to the plastics industry. George S. Brady, chief of the Substitute and Secondary Materials Section, OPM, recently pointed this out as follows:

> Plastics had a background of half a century before they got well in motion. But plastics today cannot be considered as just a substitute material, nor as one single material. There are no less than 12 separate groups of these materials, all with somewhat different characteristics, and plastics must be considered now as a group of industrial materials which stand on their own feet, although in this emergency we are calling on the plastics manufacturers to produce substitute articles from their raw materials to replace articles of metals. Many of the change-overs to plastics will involve heavy initial expense and some delays, since changes in design may have to be made, and new tools will be required. But many of such substitutions will be permanent, as the plastics are better for many uses that industry was slow to initiate previously because of this expense.

This much is very true. But the speaker evidently forgot to mention that certain supplies used in the production of plastics are necessary in the manufacture of other materials. Before long, synthetic resins may be just about as difficult to procure as some metals. What will the substitution department do then? We might recommend, in all seriousness, that castings be substituted for plastics.

—□—

JUST what will the war program mean to all of us, as consumers of goods. Some indication is found in the following paragraph of a recent address of Donald M. Nelson, director of purchases, OPM, before the National Association of Purchasing Agents:

> We can and must give up a great many comforts and luxuries. A huge amount of productive capacity which now makes goods for the civilian trade must be diverted to military production. That, of course, means that we civilians are simply going to have to do without the things that productive capacity has been making for us. We are also going to have to bid a fond goodbye to that old favorite "business as usual," because we shan't be seeing it again until the emergency is over. And above all, we have got to see that our productive capacity has got to be expanded to the utmost possible limit, even though we may not have the slightest idea how that capacity can be used profitably after the defense program is finished. We need that capacity so badly that the problem of its future use simply has got to wait.

—□—

THIS is the season of annual outings and good fellowship. I wish it were possible to attend each one, but that being out of the question, I can only wish for good weather and a barrel of fun.

F.G.S.

Activities of FOUNDRY GROUPS

Twin City

TWIN City Foundrymen's Association recently voted unanimously to change the organization to a chapter of the American Foundrymen's Association. Thirty-five firms and individuals signed the petition for the formation of a chapter, which was granted, and the organization meeting was held Monday, May 26. One hundred sixteen foundrymen and their friends were guests of the Western Alloyed Steel Casting Co. in its new office. Dinner was served in the basement of the office building at 6:30 p.m.

Following dinner the meeting was called to order by the president of the group, Fred Kaim, Union Brass & Metal Mfg. Co., St. Paul. Considerable time was taken with the roll call to introduce guests and representatives of the various firms. Following this, S. V. Wood, president, Minneapolis Electric Steel Castings Co., and one of the members of the executive committee of the local association, gave a brief talk, reminiscing on the foundry business in that district and recalling the history of the local association.

After transaction of routine business, the chairman called for the election of officers to serve for one year for the new A.F.A. chapter. The following officers were elected: Chairman, E. C. Madson, Andersen Foundry Co., Bayport, Minn.; vice chairman, R. M. Aker, Western Alloyed Steel Casting Co., Minneapolis; secretary-treasurer, O. W. Potter, University of Minnesota, Minneapolis. Directors: S. V. Wood, Minneapolis Electric Steel Castings Co., Minneapolis; Fred Christensen, R. R. Howell & Co., Minneapolis; Jack Bryant, Northern Pump Co., Minneapolis; E. H. Ryan, St. Paul Brass Foundry, St. Paul; Stuart Cameron, Valley Iron Works Inc., St. Paul; Fred Kaim, Union Brass & Metal Mfg. Co., St. Paul; E. C. Madson, Andersen Foundry Co., Bayport, Minn.

R. E. Kennedy, secretary of the American Foundrymen's Association was then introduced and he talked on chapter organization and operation. He mentioned particularly the fact that this chapter would have affiliated with it the first student chapter organized in the country, the University of Minnesota Student Chapter.

Fulton Holtby made a brief report of the chapter delegate meeting he attended at the national A.F.A. convention in New York. The meeting then adjourned to the plant of the Western Alloyed Steel Casting Co. for an inspection trip, and to watch the pouring of a steel heat from the electric furnace.—*O. W. Potter, secretary-treasurer.*

Views taken at the recently held Twin City Chapter organization meeting. The lower illustration shows from left to right: R. E. Kennedy, A.F.A.; A. W. Gregg, Whiting Corp.; R. M. Aker, Western Alloyed Steel Casting Co.; O. W. Potter, University of Minnesota; Fred Kaim, Union Brass & Metal Mfg. Co. Photos courtesy of Owen Faris, Western Alloyed Steel Casting Co., Minneapolis

Reading

PRINCIPAL speaker at the regular meeting of the Reading Foundrymen's Association held May 20 in the Berkshire Hotel was Lee Wilson, general manager, Reading Steel Castings division, American Chain & Cable Co., who discussed, "Maintaining Safety Interest in a Small Plant." The meeting was opened at 7 p. m. by President Herman P. Good with 84 members and guests present.

The address was timely and very interesting to all. Mr. Wilson has a world of experience and knowledge on that important phase of industrial management. Mr. Wilson said the key man in any safety program is the chief executive of the plant. It is management's moral interest and responsibility to its employes to see that safe working conditions are provided and no stone

(*Continued on page* 92)

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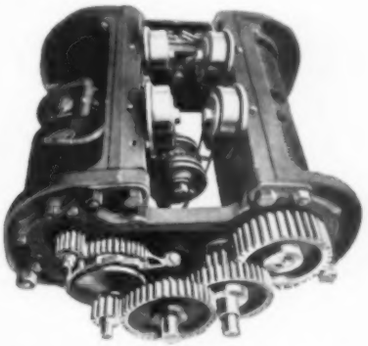

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(*Continued from page 90*)
left unturned to keep everlastingly on the job to improve safety methods and conditions. The employer also has a financial interest in safety. Mr. Wilson estimates that hidden costs of lost time accidents are at least four times as great as the direct costs that appear on the books. In his own plant the speaker stated the accident frequency rate dropped from 84.6 in 1939 to 46.4 in 1940, or a decrease of 45 per cent and the severity rate from 1.14 to 0.735 a decrease of 35 per cent, a record which he attributed to the sustained safety consciousness developed throughout the organization. The assistance of technical men in the foundry industry and safety engineers of the insurance carriers was described as an important factor in developing a safety program. Numerous questions dealing with safety matters were answered by the speaker, and there was no doubt left in the minds of those present, that a plant safety program is a big factor in the management of any foundry.

Tickets for the fourth annual picnic and golf tournament were distributed. This annual affair will be staged as usual at the Manor Country Golf Club, Fritztown, Pa., and the entertainment committee promises the usual good time for all. Both the supply men under Jimmie Hatton's leadership, and the foundrymen managed by Charley Mundell are in intensive training for that annual baseball classic for the championship cup which now is in the hands of the foundrymen. A hard fought battle is in prospect, with the betting even on the outcome.—*H. C. Cummings, secretary.*

New officers elected at the May 20 meeting of the Northern Illinois-Southern Wisconsin chapter held in Beloit, Wis. are shown at the top. Left to right they are: C. S. Neilson, director; R. W. Mattison, secretary-treasurer; G. Minert, chairman; H. L. Klopf, vice chairman; J. R. Cochran, technical secretary, and P. A. Paulson, director. Center view left to right shows C. V. Nass, Fairbanks-Morse Co., Beloit; W. A. Hambley, Allis-Chalmers Mfg. Co., Milwaukee, who was the principal speaker, and P. A. Paulson, Gunite Foundries Corp., Rockford, Ill. Bottom illustration shows part of the group attending the meeting. Photos courtesy of John Bing, A. P. Green Fire Brick Co., Milwaukee

Detroit

ABOUT 50 members of the Detroit Chapter were on hand for the final technical meeting of the 1940-41 season. Meeting was held May 22 at the Detroit Leland Hotel, with Glenn Coley, Detroit Edison Co., presiding. Speaker was Elmer C. Zirzow, core room foreman, National Malleable & Steel Castings Co., Cleveland. He presented an interesting analysis of the various types of sands used in the malleable foundry, how they are purchased, graded and mixed for use. He also examined in some detail the core practice at his plant, and showed slides to illustrate his comments. Preceding the technical address, Mr. Coley read the report of the nominating committee for new officers and directors of the chapter for the coming season to be elected at the next meeting.—*A. H. Allen, secretary.*

Quad-City

ANNUAL meeting of the Quad-City Chapter was held at the LeClaire Hotel, Moline, Ill., May 19. The business meeting was devoted to the report of the secretary-treasurer, auditing committee, trustees, membership, and the annual outing committee. The nominations made by the nominating committee at the April meeting were read and submitted for election. No other nominations were made so the slate was elected as follows: Chairman, A. H. Putnam, A. H. Putnam Co., Rock Island; vice chairman, Alex Matheson, French & Hecht Inc., Davenport, Iowa; secretary-treasurer, J. Morgan Johnson, Moline. Three members were elected to the board of directors for 3 years: Harry Mead, John Deere Harvester Works, East Moline; W. E. Jones, Bettendorf Co., Bettendorf, Iowa; and R. E. Wilke, Deere & Co., Moline. Member of the board of trustees elected to serve 3 years was Nathan Lesser, Deere & Co., Moline.

Presentations in the Quad-City apprenticeship contest in molding and

(*Continued on page 94*)

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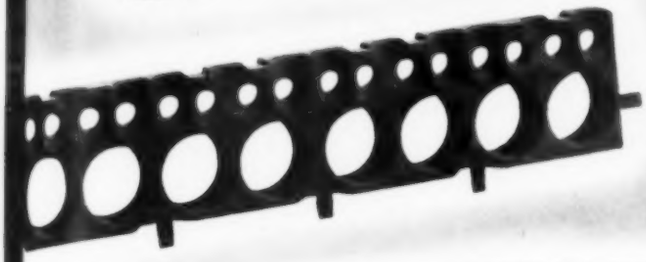

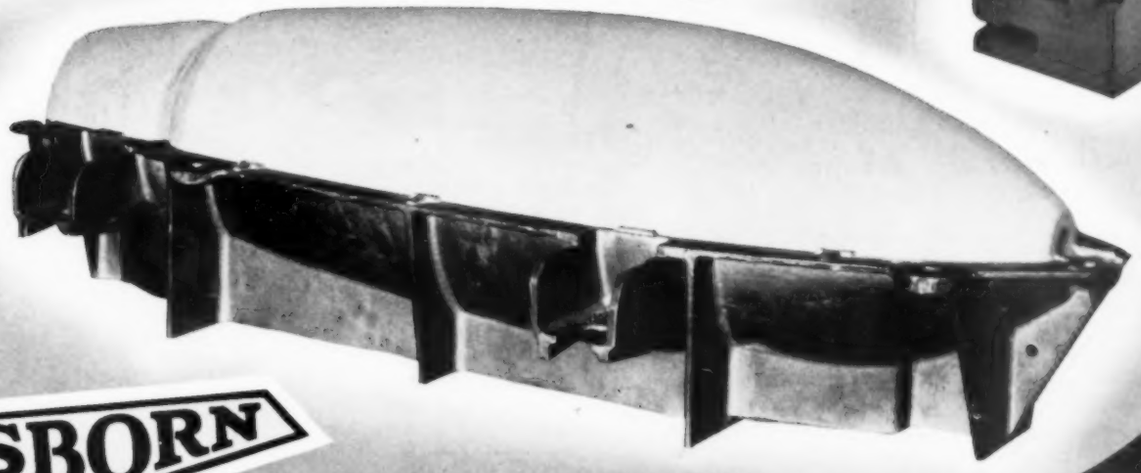

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(*Continued from page 92*)

patternmaking were made by J. H. Ploehn, chairman of educational committee of the Tri-City Manufacturers' Association and the Quad-City Chapter. M. J. Gregory, Caterpillar Tractor Co., Peoria, a member of the chapter, was presented in honor of his appointment to the board of directors of the American Foundrymen's Association.

The main speaker of the evening, L. D. Harkrider, president, General Malleable Corp., Waukesha, Wis., was introduced by Hyman Bornstein. Mr. Harkrider discussed, "How the General Manager Views a Malleable Iron Foundry," and gave many of the problems that confront him in the manufacture of malleable castings. Some of these are of a technical nature, others personal, while others are from the administrative viewpoint. A brief history of the iron and steel industry and of malleable castings was given, along with information as to the possibilities of personnel in the industry, safety programs, and legislation involving problems for management to secure co-operation of the employers and employes. Methods followed in handling many of these cases were given through use of manufacturing processes and systems of industrial relations.—*J. Morgan Johnson, secretary-treasurer.*

New England

LAST regular meeting for the season of the New England Foundrymen's Association was held at the Engineers Club, Boston, June 11. Raymond Meader, chairman of the program committee, arranged an attractive series of speakers for the meeting. In spite of the lateness of the season, approximately 100 members and guests sat down to a lobster supper which was served previous to the meeting. Preceding the speakers, C. O. Butler, president of the association, reported briefly on the results of a meeting held in Washington in regard to price stabilization of foundry scrap and its effect on New England. Mr. Butler was one of the representatives from New England at that meeting.

After announcing that there would be four speakers and that each would be allowed ten minutes for presentation and ten minutes for discussion, Mr. Butler introduced as the first speaker, P. B. Richardson, district sales manager, Harbison-Walker Refractories Co., who discussed, "Refractories."

In the short time allotted, Mr. Richardson covered that broad subject well, dividing refractories into three types, acid, basic and neutral. The advantages of silica, magnesia, and chrome brick were explained and the processes of manufacture briefly outlined. He said that in general silica brick was composed of 96 per cent silica and had a fusion point of 3100 degrees Fahr. He pointed out that magnesia brick was heavy, expensive and had quite a large expansion under heat. However, the fusion point was about 3000 to 3300 degrees Fahr. The chrome or neutral brick contains about 40 per cent chromium oxide, has an equally high fusion point, and a thermal expansion of ¼-inch per foot. Ordinary fire clay brick contains about 50 per cent silica.

F. R. Elliot, superintendent of foundry operations, Westinghouse Electric & Mfg. Co., Springfield, Mass., next discussed "Gates & Risers." He said that a gate should be designed so that it will introduce clean metal into the mold at a uniform rate. A riser usually is placed over a heavy section, and is not separated from the gate by such a thin section that it cannot be filled with hot metal while pouring. Considerable thought is now being given to pouring through risers with the advantages of: Eliminating porosity; requiring less metal; enabling the use of lower pouring temperatures and smaller risers. He elaborated on this by describing in detail a large gear casting which he has poured successfully by this method using a riser over the hub.

Warren V. B. Baker, metallurgist, Standard Foundry Co., Worcester, Mass., was called upon then to describe a study which he had been making of cupola slags. Mr. Baker said that through an examination of many slag samples he had learned to make use of the color and viscosity of cupola slags and to ascertain their effect on the temperature of the metal, iron oxide content of the slag, control of total carbon and wear and tear on the lining. He also mentioned the value of various fluxes and said that dolomite was useful in giving a certain amount of fluidity to the slag.

Robert Loss, turbo blower department, Ingersoll-Rand Co., next spoke on, "Control of Air in the Cupola." He explained that control of air weight would be of no use unless a proper sized blower is used. The weight of air going into the cupola is dependent on: Atmospheric pressure, atmospheric temperature, condition of charge, type of blower, centrifugal or positive, amount of charge. Air weight control enables a foundry to keep air at a definite weight, repeat this setting from day to day or to vary the setting at will; get the same amount of air since control can be depended upon, once correct setting is made. He called attention to the fact that leaks such as slag holes and peep holes vitally affect the constancy in the amount of air delivered.

Considerable discussion followed each speaker. There will be no regular meetings of the association until September, and the question as to whether or not an outing will be held in August is still to be decided upon.—*M. A. Hosmer.*

Philadelphia

PHILADELPHIA foundrymen and their friends took time off on Wednesday, June 11, to attend the annual outing of the Metropolitan Philadelphia Chapter, which was held at Hi-Top Country Club, Drexel Hill, Pa. While some basked in the sunshine, others played golf, quoits and baseball. The team representing the foundrymen outhit the supply men and won by the score of 15 to 8. Jimmy Hatton who pitched for the losers, got into difficulty in the third inning and was relieved by "Big Ben" Belden, who checked the hard hitting foundrymen. Jack Robb proved a very efficient umpire and called them as he pleased, (he usually does).

Dinner was served in the early evening and over 250 were present. It was a delightful meal and there were door prizes galore. The floor show that followed consisted of novelty acts, singing, and plenty of dancing girls. The entertainment committee that arranged the outing included: Chairman, John M. Robb Jr., Hickman, Williams & Co.; L. Dill, George F. Pettinos Inc.; W. J. Gallana, Rogers, Brown-Lavino Co.; J. H. Hatten, Taggart & Co.; H. E. Mandel, Pennsylvania Foundry Supply & Sand Co.; J. F. Adams, Crucible Steel Castings Co., Lansdowne, Pa.; Stanley C. Kirn, M. L. Kirn & Bro.; Horace Witherington, H. W. Butterworth & Sons, Bethayres, Pa., and Alan G. Van Wye, Olney Foundry Co.

All had a grand time and Jack Robb was re-elected chairman of the entertainment committee. His committee deserves much credit for the manner in which the outing was handled.—*J. T. Fegley, chairman, publicity committee.*

Pittsburgh

FINAL technical meeting of the year for the Pittsburgh Foundrymen's Association was held at Clifford B. Connelly Trade School, where members inspected the foundry and watched pouring of a heat. Dinner was served in the school's restaurant, where the workings of the foundry course were explained by W. H. Dosey, foundry instructor.

Apprentice training was the subject under discussion, with James

(*Continued on page 97*)

(*Continued from page 94*)

G. Goldie, Cleveland Trade School, Cleveland, the principal speaker. Mr. Goldie, national chairman of the American Foundrymen's Association apprentice training committee, outlined the work which has been done in Cleveland to establish a definite apprentice training program. Methods of obtaining equipment, interesting boys in the work and locating jobs for them were outlined.

New officers were approved unanimously, and accepted their jobs which are effective July 1. They are as follows: C. J. Scheckhaus, Union Spring & Mfg. Co., president; W. H. Satterfield, Pittsburgh Steel Foundry Co., vice president; C. H. Paul, Mackintosh-Hemphill Co., who was elected secretary-treasurer.

Pittsburgh foundrymen hold an outing. Photos courtesy of R. L. Hartford

On June 9 the year's activities were wound up with the annual outing held at Chartiers Heights country club. Nearly 400 members and guests turned out, with the weather perfect for the first time in years. W. H. Scott, Pittsburgh Coke & Iron Co., was chairman and did an excellent job in providing golf, horseshoe pitching and mushball for the athletically inclined and plenty of indoor sport for those who were not. Prizes were awarded for the golfers with plenty of door prizes waiting for the non-golfers. Buffet supper was served.—*R. L. Hartford.*

Cincinnati

THIRTY-FIVE members and guests were present at the May 20 meeting of the Cincinnati District Chapter held at Shullet's Restaurant. H. F. McFarlin, chairman, presided and Elmer J. Carmody, Charles C. Kawin Co., Chicago, discussed heading and gating. In a short business session preceding the paper of the evening, Mr. Gosiger announced plans for the chapter's annual outing. Mr. Caine presented the nominating committee's reports to be voted upon at the annual outing next month.

Mr. Carmody handled his subject of "Gates and Heading" in a delightfully informal manner. He invited interruption for discussion on any item as presented. He summed up his subject by expressing the opinion that it is largely up to the individual foundryman and when a combination of gates and risers which works is found, stick to it. Stereopticon slides and spirited discussion of the items illustrated, rounded out his presentation of the subject.—*Henry M. Wood, secretary.*

N. Ill.-S. Wis.

ANNUAL election of officers of the Northen Illinois-Southern Wisconsin Chapter was held May 20, at the Hotel Hilton, Beloit, Wis. The meeting was called to order by Chairman P. A. Paulson, who presided at the business meeting during which the following officers were elected to serve for the coming year: Chairman, George Minert, Gunite Foundries Corp., Rockford, Ill.; vice chairman, H. L. Klopf, Fairbanks, Morse & Co., Beloit, Wis.; secretary-treasurer, R. W. Mattison, Mattison Machine Works, Rockford, Ill.; technical secretary, J. R. Cochran, foundry division, Sundstrand Machine Tool Co., Rockford, Ill. Directors: C. S. Nielson, George D. Roper Corp., Rockford, Ill.; P. A. Paulson, Gunite Foundries Corp., Rockford, Ill.; and Max Reutter, Fairbanks, Morse & Co., Beloit, Wis.

A total of 54 were present of which 12 were visitors. Following the business meeting W. A. Hambley of the Allis-Chalmers Co. gave an intereseting talk on the work of the gray iron casting defects committee of the American Foundrymen's Association. He aroused a great deal of interest in the report of this committee, which is to be published in the near future, as well as an immediate discussion on that important subject. The annual stag picnic and outing of the chapter was held at Svithiod Park just south of Rockford on June 7. Lunch, and chicken dinner, ball games, quoits, and golf featured the program, as well as attendance prizes and the inevitable talkfests which are a long remembered feature of any gathering where good foundrymen get together. The outing was the last chapter meeting for the season.—*J. R. Cochran, technical secretary.*

Western N. Y.

AT THE meeting held May 2, the Western New York Chapter had the largest attendance of any business meeting held this year. One of the members of the chapter gave a preview of an industrial film prepared by his firm and its presentation was appreciated by all. During the meeting, an amendment to the by laws, increasing the board of directors from six to nine members, was approved. Following the usual drawing of the secretary's prizes, which is confined to those who send in their reservation cards, the chairman asked the secretary to introduce the speaker of the evening, William J. Picard, chairman of the board of standards and appeals of New York state.

Mr. Picard, who has been in public service for over 30 years and who was deputy industrial commissioner at the time Governor Lehman appointed him to the chairmanship of the newly created board of standards and appeals, gave a most friendly and informative talk on, "Constructive Contact between State and Industry." He outlined the duties and responsibilities of the board to provide for and obtain by rule the protective elements afforded employes by legislation, and he also pointed out the board's desire to obtain the constructive help and suggestion of industry in formulation of those rules and the methods and procedure of appeal. Mr. Picard also dwelt on the board's desire in every instance to avoid red tape or unnecessary restrictions that would hamper production in this time of defense need. His frank explanation of the board's obligations as well as industry's, dispelled all thought of bureaucracy and developed among those present a distinct feeling of confidence in the entire set up of the board of standards and appeals under his chairmanship.—*Eliot Armstrong, secretary.*

Birmingham

BIRMINGHAM District Chapter met at the Thomas Jefferson hotel, May 23, for the last meeting of the season. Dinner was served to 60 members and guests, while 160 attended the technical session and entertainment. Officers were elected for the coming year as follows: Chairman, J. A. Bowers, American Cast Iron Pipe Co.; vice chairman, J. E. Reynolds, U. S. Pipe & Foundry Co.; secretary-treasurer, H. G. Mouat, Foundry Equipment Co. Directors, Wayne Nelson; J. A. Woody, American Cast Iron Pipe Co., and W. O. McMahon, Sloss-Sheffield Steel & Iron Co.

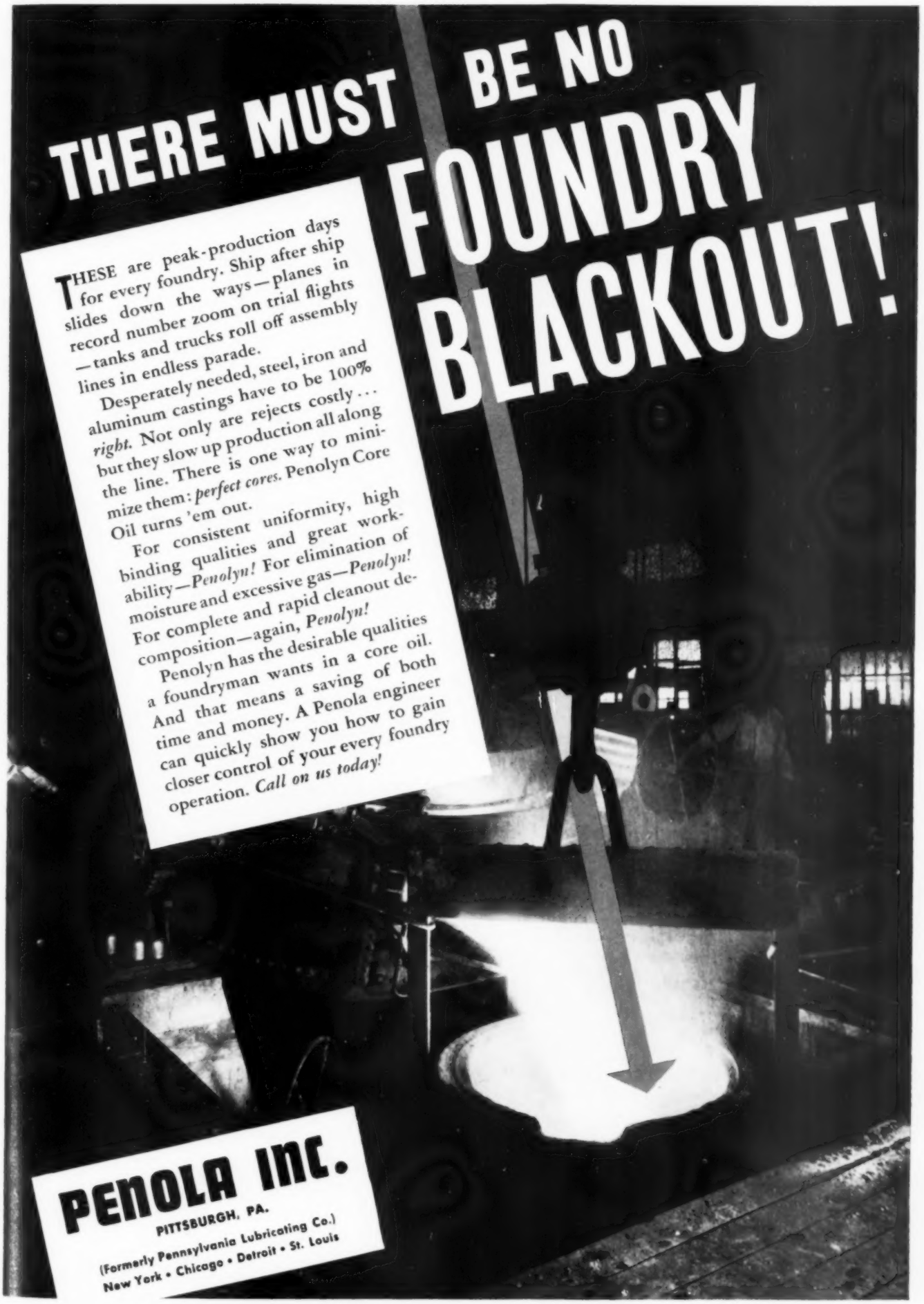
The technical session program was entitled, "A Soil Pipe Clinic." Soil pipe is the foundry product used for sanitary drainage systems and manufactured extensively in the Birmingham district. Speakers on the program were Jess Landers, Holt, Ala., Sam Covington, Chattanooga, Herbert Pharr, Alexander City, L. B. Molloy, Anniston, and Ernst Buck, Birmingham.

A feature of the meeting was the presentation to the chapter by the retiring chairman, W. O. McMahon, several *old timer* foundrymen of the district with the statement of their number of years of foundry work. The *old timers'* familiar faces in Birmingham foundry circles and years of service were William Bowers, 53 years; Mike Hayes, 55 years; George Williamson, Hardie-Tynes, 50 years; Jack Morris, 46 years; William Oberhelman, 41 years; Louis Smith, 44 years. To honor these distinguished veterans was one of the features of the meeting.

For the past year Birmingham has had the distinction of having one of its members serve as president of the American Foundrymen's Association. L. N. Shannon, vice president, Stockham Pipe Fittings Co., upon completion of his term as president, has become one of the national directors of the association.

The Birmingham chapter, aside from its regular formal meetings, for several months has been carrying on an intensive training program for apprentices with the plan of supplying the industry with skilled workmen promptly for the recent rush of manufacture. In common with other industries, foundries neglected training during the recent less active years, and increased ac-

(*Concluded on page* 100)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(Concluded from page 98)

tivity has revealed a handicap in the form of a shortage of skill. The training course was a series of lectures by experts in foundry work. R. L. Ogden, Stockham Pipe Fittings Co., was director of the course and has brought it to a highly successful conclusion for the season.—*C. S. Whittet*

Nor. Iowa

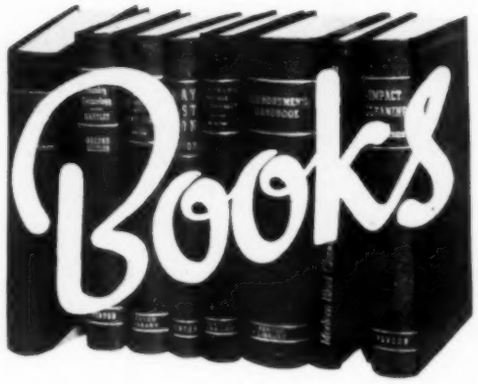
ANNUAL business meeting of the Northern Iowa Foundrymen's Association was held at Black's Tea Room, Waterloo, Iowa, on April 29. Approximately 45 members and guests were present for the election of officers for the year 1941-42. Those elected are: President, Ed. Jochumsen, Litchfield Foundry; vice president E. L. Fay, John Deere Tractor Co.; secretary, F. R. Snyder, John Deere Tractor Co.; treasurer, C. H. Harmon, Harmon Foundry Co.; and sergeant-at-arms, H. H. Miller, retired, formerly of the Headford Bros. and Hitchins Foundry Co. Speaker of the evening was W. R. Jennings, foundry superintendent, of the John Deere Tractor Co., whose talk on "Foundry Problems and Possibilities" pointed out both the pitfalls and the future opportunities which await the present day foundryman.

One of the bronze plaques presented to the old timers by the Wisconsin chapter

There was an attendance of over 300 at the annual safety meeting of the association held May 23 at Waterloo, Iowa. This meeting was sponsored by the safety department, John Deere Tractor Co., in conjunction with the Northern Iowa Foundrymen's Association. In addition to foremen of the Deere company and members of the association, guests were present from Rath Packing Co., Galloway's, Litchfield's, Oliver Farm Equipment Co., W. C. F. & N. railroad, Illinois Central railroad, Construction Machinery Co., and many other firms in the territory. The speaker of the evening was Dr. Allen A. Stockdale of the staff of the National Association of Manufacturers, who presented a very timely and inspiring talk on "Safety and the American Way." Dr. Stockdale was introduced by H. W. Rehder, safety director of the John Deere Tractor Co .In his talk, Dr. Stockdale pointed out several instances of the results of scientifically directed safety campaigns and showed the true place of safety in our American democracy.—*F. R. Snyder, secretary.*

W. B. Coleman & Co. has moved its office and laboratories from 1920 West Indiana avenue to Ninth street and Rising Sun avenue, Philadelphia.

Old timers and young timers were honored at the recent meeting of the Wisconsin chapter. Photos courtesy John Bing, A. P. Green Fire Brick Co., Milwaukee



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213 pages, 38 illustrations, $4 postpaid. This book, by C. A. Reams, engineer of Ford Motor Co., brings latest and most approved methods of casting cleaning to foundrymen in plain language. It is full of completely practical suggestions and proved methods and practices. Application of cleaning methods discussed will eliminate many objectionable cleaning room practices. Full information on abrasive selection and use is included. Practical foundrymen report this book worth many times its cost.

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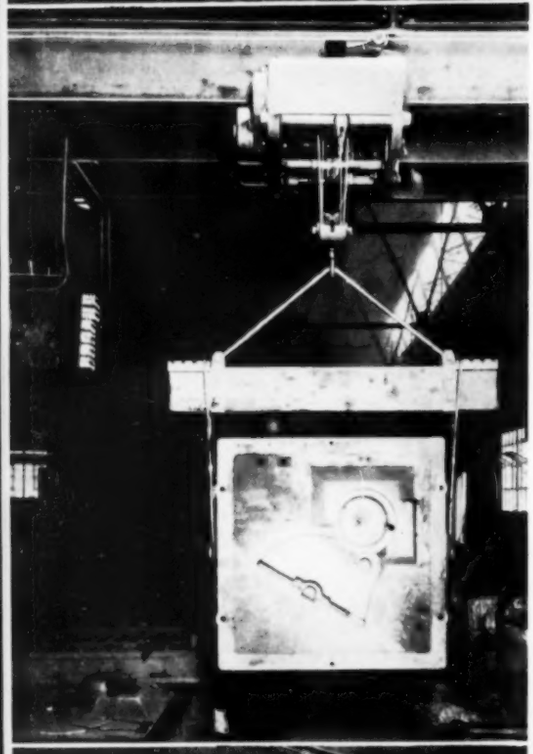
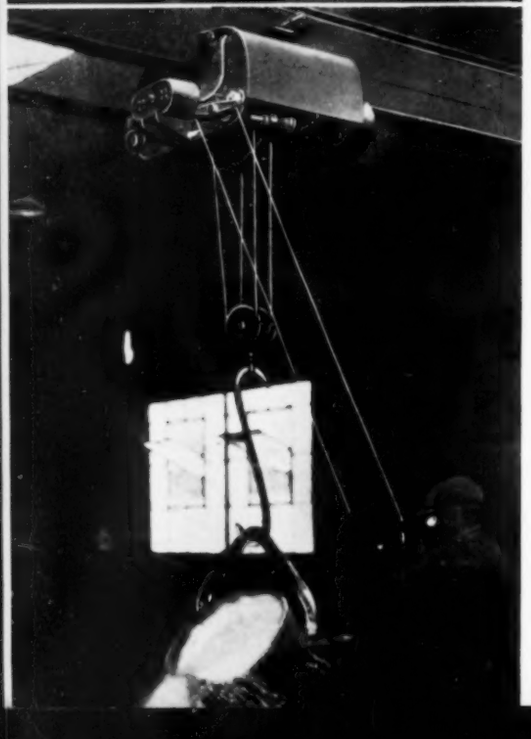




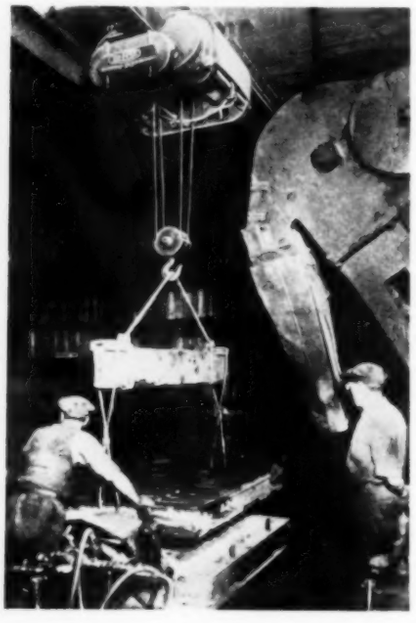
HANDLING MATERIAL and EQUIPMENT in the Foundry

By C. A. BOECKER
Hoist Engineer
American Engineering Co., Philadelphia

MATERIALS and equipment in a foundry should be handled so that all work from the unloading of raw materials to the shipping of castings can be carried on without interruption. Electric hoists have proved their value in fast, economical lifting and transportation of foundry materials.

A good example of the use of monorail electric hoists for handling materials and equipment from the receiving door to the shipping room may be found in the foundry of a well known manufacturer of heavy machinery.

Raw foundry materials are delivered by railroad cars spotted on a siding opposite the receiving department. The cars are unloaded with a 2-ton plain trolley hoist, equipped with a variable speed, floor-operated, pendant-cord control. This hoist transports the materials from the cars and carries them to their proper places in the storage room. The same hoist also is used to make up the cupola charge.



A 4-ton motor-driven trolley-hoist on a bridge crane serves the entire core shop and its storage loft. The hoist is equipped with pendant-cord, floor-operated, foundry control and resistor bank designed for 90 per cent speed reduction in both directions. The trolley and bridge have auto-accelerating push button control. All four buttons for the trolley and bridge controls are contained in one enclosure. In order that the operator may be near the hoist hook at all times, all controls are mounted on the hoist, and the push button station is adjacent to hoist control ropes.

After the cores are completed at the work benches, they are picked up by the hoist and deposited in core oven cars, preparatory to baking. Foundry control of the hoist motor permits handling the green cores without damage. When the cores are baked, the cars are pulled from the ovens and spotted on the large casting floor.

The casting section is equipped with many wall type, swinging jib cranes which are located so their combined operating areas include the major portion of the floor. Each jib crane as shown in Fig. 4 has a 2-ton, hand-geared trolley-hoist equipped with pendant-cord, floor-operated foundry control. The molders use the hoists to position the copes and drags, place the patterns, turn the drags, part the copes and drags, pull the patterns from the sand, set cores and close the molds as shown in Fig. 2. Most of these operations require delicate hook control which is accomplished satisfactorily by foundry control of the hoist motor.

High over the jib cranes in the large casting section are three 5-ton, 3 motor, cage-operated, bridge cranes. They cover the entire large casting floor. All controls for each

Fig. 1 (Upper left)—View in the cleaning room showing one of the 5-ton, motor driven trolley hoists employed. Hoist has a pendant cord, floor operated variable speed control. Fig. 2 (Center)—On the foundry floor hoists are used to handle the molds, and for other operations. Fig. 3 (Left)—Pouring molds from ladle suspended from hoist. Fig. 4 (Above)—Trolley hoist attached to jib crane

crane are mounted in their respective cages. The hoist motors are foundry controlled; the trolley and bridge motors have variable speed control.

The three motor cranes handle the heavier work at each end of the large casting section, and in addition are used for other purposes which will be mentioned later.

Beyond one end of the large casting section is a storage space with a monorail and switch system, designed so that a 5-ton motor-driven, trolley-hoist operating on it can serve the entire area. The monorail system extends out over the sidewalk so the hoist can be run outdoors to unload delivery trucks. As this hoist is never called upon to perform any delicate handling operations, it is equipped with pendant-cord, floor-operated, variable speed control for both motors.

The bay adjacent to the large casting section is divided into three sections; small castings, medium size castings and repair shop. The repair shop is partitioned off from the casting floor.

Hoists Operated from Floor

Over the medium size casting section is a 5-ton 3-motor bridge crane. All controls are pendant cord, floor operated and mounted on the hoist so they are near the hook. The hoist motor has foundry control and the other two motors have variable speed control. This hoist is used for general handling of material. The repair shop has a monorail system and a 2-ton plain trolley hoist with variable speed, pendant cord, floor operated control which handles the heavier pieces of equipment that are to be worked on.

The cupola is on the same side of the large casting section as the large core room and is about in the middle of the floor. When the cupola is ready to be tapped, ladles are suspended from the hoist hooks of the 3-motor cranes in the large casting section. The two end cranes carry molten metal from the cupola to the molds on the large casting floor.

The middle crane transports a loaded ladle from the cupola across to a monorail trolley, which juts out from the small casting floor. From the crane the ladle is placed on a hook suspended from the monorail trolley and the trolley is then moved about in the small casting bay. Hand ladles are used by the molders to take metal from this ladle to pour their molds.

While the ladle in the small casting section is being emptied, the middle crane picks up another ladle of molten metal from the cupola and transfers it to the hook of the 5-ton hoist in the medium size casting service. Fig. 3 shows molds in this section being poured directly from the ladle suspended on the hoist hook of this piece of equipment.

After the large castings have been broken out of the sand, they are carried to the cleaning room by the 3-motor cranes. In the cleaning room, several 5-ton motor driven trolley hoists with pendant cord, floor operated, variable speed control for both motors, shift the castings around as required as shown in Fig. 1.

When the castings have been cleaned, they are carried to the shipping room by the hoists. The shipping room has several hoists of the same type as the cleaning room. These hoists carry the cleaned castings to scales where each casting is weighed. Following weighing, the hoists pick up the castings and carry them to railroad cars on the same siding upon which raw materials are delivered to the foundry.

Show New Conveyor

A working demonstration of its latest type vibrating conveyors was the feature of a 3-day sales convention and trade press preview staged on May 22, 23 and 24 by the Conveyor and Screen division, Ajax Flexible Coupling Co., Westfield, N. Y. before an interested assembly.

A feeder and conveyor line 83 feet long carrying foundry sand at the rate of 90 tons per hour was in operation. This unit is part of a complete sand handling system totaling over 900 feet in length being built for a large production foundry in the middle west. The sales convention was in charge of W. T. Welch, president and Wayne Belden, vice president and general manager. Informal technical discussions were conducted by R. L. Johnstone and L. O. Cook of the firm's engineering department.

Publishes Manual

American Society for Testing Materials has published the 1940-41 Manual of A. S. T. M. Standards on Refractory Materials. It contains 180 pages and presents in their latest form all A. S. T. M. specifications, tests and definitions covering those materials, and gives considerable other information and data significant in the field of refractories. Copies of the manual may be obtained from the society at 260 South Broad street, Philadelphia for $1.50 in board cover or $1.75 in cloth.

West Steel Casting Co., Cleveland, has backed a basketball team in the industrial A division for two seasons. This season the team finished runner up and will receive a trophy. In the picture reading left to right: Sitting, Adolph Jalen, pattern maker; Joseph Sowchyn, molder helper, Ray Fitzgerald, core clerk. Standing, Herman Vogel, molding foreman; Philip Kraynak, machine tool operator; Nick Pearman, molder helper; Paul Davis, millright helper; Carl Wosnak, captain and coach, molder; Anthony Mackay, manager of the team, paymaster. Members of the team who were absent at the time the picture was taken are Maurice Rose, who is no longer in the employ of the company; and Frank Bucholtz, who is in training at Camp Lee, Va.

THE IRON-CARBON SYSTEM AND ITS EFFECT ON CASTINGS

By J. W. JUPPENLATZ
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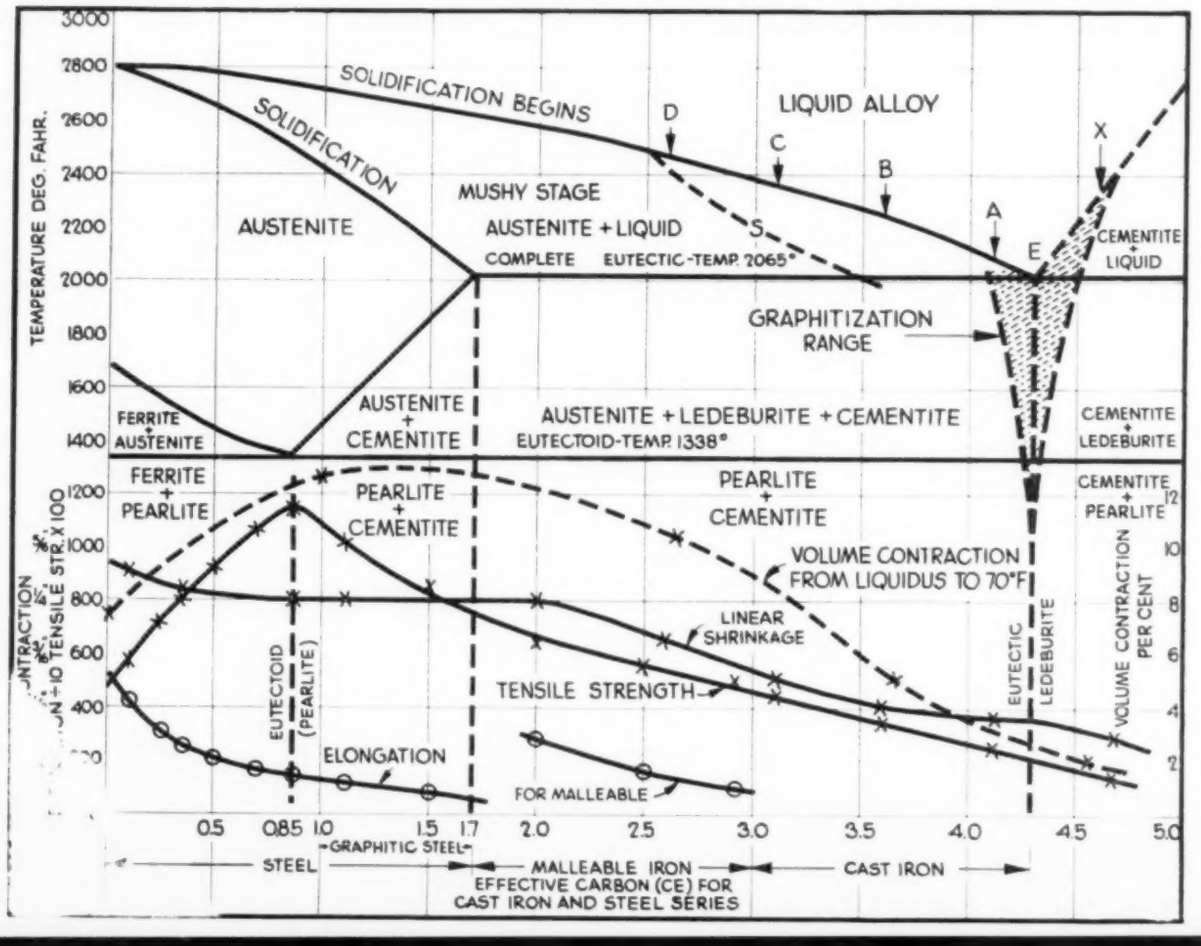
IN FERROUS foundry practice we constantly use iron as a base material with varying amounts of carbon along with other elements, some of which may be classified as impurities. We can produce soft steels, medium steels, tool steels, graphitic steels, malleable iron, high strength cast iron and soft cast iron by increasing the percentages of carbon in iron. Carbon is the controlling factor, with or without the addition of other elements.

It is not the author's intention to discuss the intricacies of the evolution of the iron-carbon diagrams nor all the factors which we know affect the position of the various phases. The iron-carbon system as known today does not include the effects of impurities such as manganese, silicon, sulphur and phosphorus, and those elements inject unknown and questionable phases into the iron-carbon system. However, endeavor will be made to make use of it to exemplify its effect on castings. While actual temperatures and carbon contents may be used, it should be understood that these positions or points are affected materially when impurities are present as in regular foundry practice. The steels and irons which will be considered and discussed normally are classed as unalloyed, containing the usual amounts of manganese, silicon, phosphorus and sulphur, unless otherwise noted. In this manner, it is hoped that some of the theory involved can be tied in with practical observations of actual foundry work. Apologies are not in order, but work now in progress or in the future may substantiate or reject some of the present reactions and therefore they are offered in that spirit.

To plot the iron-carbon curves, the temperature becomes the ordinate and the carbon content the abscissae as shown in the accompanying illustration. At a temperature of 2795 degrees Fahr. pure iron melts and as we add carbon, the melting point decreases up to a certain point called the eutectic which is the lowest melting point of the series. The eutectic composition is considered to be 4.3 per cent carbon with a melting point of 2065 degrees Fahr. From this eutectic point a further increase in carbon raises the melting point as represented by the dotted line, to a point where no further carbon can be put in iron, a theoretical value of 6.68 per cent carbon representing iron carbide or cementite, Fe_3C. While pure cementite never has been pro-

Iron-carbon diagram on which has been superimposed data on tensile strength, elongation, linear contraction and volume contraction



duced, its melting point is estimated to be 3632 degrees Fahr. The melting points above the eutectic composition are somewhat uncertain due to the instability of the alloy in conducting the tests.

Before going further it may be desirable to classify irons and steels as we generally use them with normal silicon contents. Alloys of iron with carbon contents up to 1.7 per cent carbon usually are termed steels, with the graphitic steels from 1.0 to 1.7 per cent carbon containing over 1 per cent silicon. Above 1.7 per cent carbon to 4.3 per cent carbon the range is known as cast iron, with malleable running from 1.7 to 3 per cent carbon.

Effect of Carbon

To use the pure iron carbon system to the best advantage for practical purposes, reference should be made to what is known as the effective carbon. Since carbon and silicon are controlling elements in the production of cast irons, this phase should not be neglected. We know that silicon causes changes in the eutectic composition, melting temperature and other constants. Bolton's calculations have been used in the past few years by various investigators using the formula for determining the effective carbon as:

C_e = C plus 0.3 Si. where the C_e is the effective carbon.

For example, an iron containing a total of 3.00 per cent carbon and 2 per cent silicon would have an effective carbon of 3.60 per cent. By that conversion we may use the iron-carbon system as base, taking into account the silicon values. This formula is sufficiently close to be of practical value to the iron foundry, but it cannot be applied to steels without modification. The author has used the formula of C_e = C plus 0.1 Si for steels and for practicable purposes it works satisfactorily. However, the steels which will be referred to in this discussion contain about 0.30 per cent silicon and that content may be considered negligible.

Returning to the curve it can be seen easily how carbon effects the melting point. Above the top line as indicated, the alloy is completely liquid or in a state for casting. Fluidity of metal is of prime importance depending upon temperature of pouring and composition. Carbon and silicon contribute to the running qualities of practically all iron base alloys including austenitic steels. When very low carbon contents are specified, the fluidity may be increased by the addition of more silicon. If we would use a pouring temperature 200 degrees in excess of the melting point, it is seen easily that the temperature would drop with increasing carbon contents until the eutectic point is reached.

Molds to receive this molten metal must be prepared so that clean castings will result with the least amount of adhering sand. The sand required for soft cast irons may be of a lower refractory type than those necessary for low carbon steels. Graphite (carbon) is one of the best known refractories. Silica is also a good refractory. Both of these materials are used in the finely divided form as mold facings.

To put carbon into iron above its eutectic composition, requires considerable heat and even then the results are not always consistent. Let us consider that an iron-carbon alloy of eutectic composition neither wants to absorb, or to reject carbon. In other words, as the carbon content decreases below the eutectic composition, the alloy has a greater affinity for carbon providing the temperature is sufficient. An iron above the eutectic composition will reject carbon upon cooling, which we generally term as *kish*. Briefly, a low carbon steel is hungry for carbon and a high carbon iron will repel it.

Mold Washes Fail

These points are brought out to clarify some of the reasons why certain types of mold washes and sand mixtures fail to produce smooth castings. It is a custom in the iron foundry to use carbonaceous substances such as sea-coal in the sand with graphite mold washes.

When cast iron is low in carbon, well below the eutectic composition as in high strength irons, it has quite an affinity for carbon. A practical molding incident is cited in connection with that statement. Several years ago when we tried to make some of the early high strength irons, our castings came out pretty rough with so much adhering sand that trouble was encountered in machining, even after a good blasting. Yet the surfaces of the regular gray iron castings were clean and smooth. The same molds, sand, graphite facing and molders made the work.

We blamed the roughness of the castings on high pouring temperatures and tried to remedy the condition by using more refractory, steel types of sand. Nothing seemed to work until we tried a second mold blacking. The castings came out clean with the sand peeling nicely. The mold blacking was comprised mainly of ground coke, clay and silica.

What took place when we used pure graphite facing evidently was due to the low carbon content of the metal. The high pouring temperatures were a disadvantage. When we poured the low carbon iron into these molds, contact was made with the graphite facing and it was absorbed, raising the carbon content of the metal. The melting point thus was lowered, permitting greater fluidity. Sand grains were left practically unprotected, permitting the iron to penetrate into the voids of the mold surface. You may easily visualize the appearance of these castings.

However, when we used a facing with less carbon and more siliceous material, the iron could not absorb the carbon of the mold wash since it was inhibited by the presence of silica. The author recalls an extreme case when we tried an experiment of casting steel into a graphite faced mold. Comments are not really necessary, but it is a fine way to get a rough casting.

Silica for Steel Molds

Mold washes for steel castings are usually of a siliceous nature with little carbonaceous matter present. These washes are not used generally in the iron foundry, because graphite or carbon is a better refractory material. However, the point to be stressed is that with graphitic steels or low carbon cast irons a combination of carbon and silica as a wash is advantageous.

When a soft cast iron nearing the eutectic composition is poured into a graphite faced mold, we often encounter defects in the upper cope sides of the casting. The defects are primarily pockets of carbon or possibly kish. During pouring the graphite mold facing may become loosened, and it then floats upon the iron. The metal, being high in carbon or even saturated as in hypereutectic irons, will absorb no more carbon, with a tendency to reject carbon from within itself. Obviously, that is not a desirable condition. To prevent the formation of these kish like pockets, a lower carbon iron may be used which will absorb carbon tending to eliminate those defects.

After the casting has been poured from the liquid state, it naturally cools and freezes. Below the melting point freezing takes place over a range of temperatures, with exception of the eutectic composition and pure iron. As cooling takes place a portion of the metal starts to crystallize while the balance is still liquid. The mixture continues to freeze with the lowering of temperature until the eutectic composition and temperature is reached when alloys of 1.7 to 4.3 per cent carbon are completely solid. The eutectic line may be extended for alloys of more than 4.3 per cent carbon. Alloys from 0 to 1.7 per cent carbon are completely solid from the eutectic temperature to the melting point to pure iron as indicated by the curve.

Alloys within this range of temperature are mushy, neither completely solid nor liquid. As the tem-

perature is lowered, the mixture becomes thicker and more pasty. Analogy may be made to plumbers' solder as used for the wiping of lead pipe joints. Consequently, the iron in the mushy state has no particular strength and is a condition which causes the foundryman much grief with internal shrinkage, hot tears or hot cracks. Castings are usually of nonuniform design with heavy parts adjoining lighter sections. Solidification takes place in castings by the formation of an outer skin first and progresses toward the center. Light sections will have solidified before the heavier sections which may still be molten in the center portions.

Composition Is Important

There are three types of contraction exhibited when molten metal is cooled to room temperature: 1. Volume contraction in the liquid state; 2. Contraction during solidification; 3. Contraction after solidification. Composition plays an important part in these different phases of shrinkage.

Saeger and Ash published an interesting series of tests on cast irons showing a total linear contraction of 0.67 per cent for very soft cast irons to 1.10 per cent for pearlitic high strength irons from a temperature range of 2102 degrees Fahr. to room temperature. White irons over this same range gave about 2 per cent total linear contraction. Volume contraction during solidification or the mushy state, ranged from negative shrinkage for very soft or hypereutectic irons to 1.94 per cent for a pearlitic iron containing 0.85 per cent combined carbon. The white irons had from 4 to 5.8 per cent volume contraction within the same range of solidification.

Liquid volume contraction increases with greater amounts of carbon, laboratory tests indicating the liquid volume contraction per 100 degrees Fahr. of pure iron to be 0.44 per cent and soft cast iron 0.61 per cent of the volume at room temperature.

Available data coupled with practical experience confirms that as the mushy range widens, as shown by the diagram, it becomes increasingly difficult to obtain good sound castings with freedom from hot cracks and internal shrinkage voids. Castings, at those mushy temperatures, or even slightly below the mushy ranges are very weak with no appreciable elongation. Also, as the mushy range widens, the range of contraction increases and the danger of hot tearing due to mold resistance, becomes greater.

Let us assume the cooling rate of a casting to be approximately constant if the mushy range is wide or narrow. Therefore, if the mushy range is short, contraction within this range will be a minimum, with the casting acquiring earlier strength and ability to elongate upon hindered mold contraction, reducing the possibilities of hot tear formation.

To apply practical experience to confirm this thought, four types of cast iron are indicated on the diagram: *A*, being nearest the eutectic composition, *B*, *C* and *D* further away respectively. If we take comparable castings, we will agree that iron *A*, which is the softest iron, with the shortest mushy temperature range, will have the least total linear contraction, with the smallest contraction during solidification, requiring the smallest riser. Irons *B*, *C* and *D* are respectively harder and will proportionately increase in shrinkage and require larger risers as the mushy gap widens. The danger of hot tears and internal shrinkage of iron *D* will be the greatest as the mushy range is wider.

Has Wide Mushy Range

Practical observations indicate that a similar phenomenon applies to cast steels as well as cast irons. A 0.50 to 0.80 per cent carbon steel has quite a wide mushy range. The internal shrinkage and hot tear formation seems to be greater than the lower carbon grades. However, the total linear shrinkage is the greatest for low carbon steels and this may be due partially to the required higher pouring temperatures. We have produced many steel castings with 0.10 per cent carbon which according to the diagram have a very short mushy range. No difficulties of hot tearing, checks or internal shrinkage of unusual nature have been experienced when reasonable care has been used in heading and gating.

The type of shrinkage in the heads is quite different than that of higher carbon steels. It is very shallow, not of deep piping character, which indicates complete solidification within a very narrow temperature range. According to an investigation published by the British Iron and Steel institute covering a range of carbon steels, the low carbon steels of 0.10 per cent carbon and under exhibit the lowest tensile strength with the highest elongations immediately below the solidification point after casting. The data contained in that report indicate that as the mushy range widens, the deformation qualities are d i m i n i s h e d which permits greater opportunities for hot tear formation in steel castings.

Since foundries must cast metal into sand molds for castings with uneven cross-sections, difficulties arise and composition plays an important part in the production of sound castings. Naturally the sand mold must be strong enough to withstand the molten metal, but an ideal mold would be one that would collapse during the solidification process releasing any tendency to hold the metal from normal shrinkage. Also another ideal condition would be the complete solidification of the metal in the mold at the same instant. But these conditions are virtually impossible to attain and we do our utmost to combat shrinkage and hot tears, by making molds that will collapse with proper gating, heading, chilling and watching the temperature gradients.

The author believes there are many chemical requirements existing for castings copied basicly from other specifications, which could be materially improved if we had more data as to the mushy ranges, shrinkage and volume changes during solidification. Good sound castings are often far more important to the user, than the specified composition, which may have nice physical properties, excepting those which help to make sound castings.

This is the first of two articles from a paper presented at a meeting of the Reading Foundrymen's association. The second article will appear in an early issue.

THE EDITORS

Using Anthracite In the Cupola

In the *Transactions* of the Fourth Annual Anthracite Conference of Lehigh University held at Bethlehem, Pa., on May 8 and 9, an extensive paper describing an investigation on use of anthracite coal in the cupola is presented. Prepared by J. F. K. Brown and Earl E. Roecker the paper gives data on 63 tests run in a 36-inch cupola under a wide variety of conditions with anthracite coal as the fuel.

"Industrial Training Programs for Increased Production" is the title of a booklet recently published by the American Management Association, 330 West Forty-second street, New York, and available for 75 cents a copy. Phases of that subject are discussed by Albert Sobey, director, General Motors Institute; Ray J. Blyth, personnel director, Warner & Swasey Co., who discusses the learner training program developed by his organization; A. M. Rupkey, manager of training, Bethlehem Steel Co., who describes the emergency training program of that concern; "Training of New Employes," by H. A. Huffman, assistant general superintendent, Arrowhead plant, Armstrong Cork Co.; "Apprenticeship's Contribution to Production for National Defense," by William F. Patterson, U. S. Department of Labor.

OPERATES MECHANIZED SHOP

(*Continued from page* 62)

that groups of five or six molds are loaded on platens. At the gangway end of each conveyor line the molds are dumped on gratings in the floor. Castings are removed by lift truck while the sand falls through the grating on to a belt which carries it to the sand preparation plant.

At the sand preparation unit, metallic inclusions are removed with a magnet, core butts and lumps by a screen and fines by a suction system to regulate the permeability. The sand is measured in specially built hoppers which discharge into two 8-foot diameter mullers made by the National Engineering Co., Chicago. The mullers are located side by side and are used as occasion demands for mixing backing sand, facing sand and core sand. Backing sand is lifted by an elevator and discharged onto a belt which feeds the hoppers over the molding machines. Facing sand is discharged into tote boxes and distributed to various points by truck or by the crane. Core sand is taken to the core rooms in the same manner.

In revamping the pit floor a large rollover machine was installed for ramming many of the large molds. A portable type sand slinger made by the Beardsley & Piper Co., Chicago was reconditioned and a feeder was installed for the proper delivery of sand. Molds are placed on a series of roller conveyors where they are poured and where the empty flasks are returned to the molding station. Loads are handled by two free standing jib cranes and a swinging type wall crane. These cranes also are employed in setting cores in the large molds made in pits or in flasks, thus relieving the main overhead traveling crane of a great deal of routine work and the tying up of other operations.

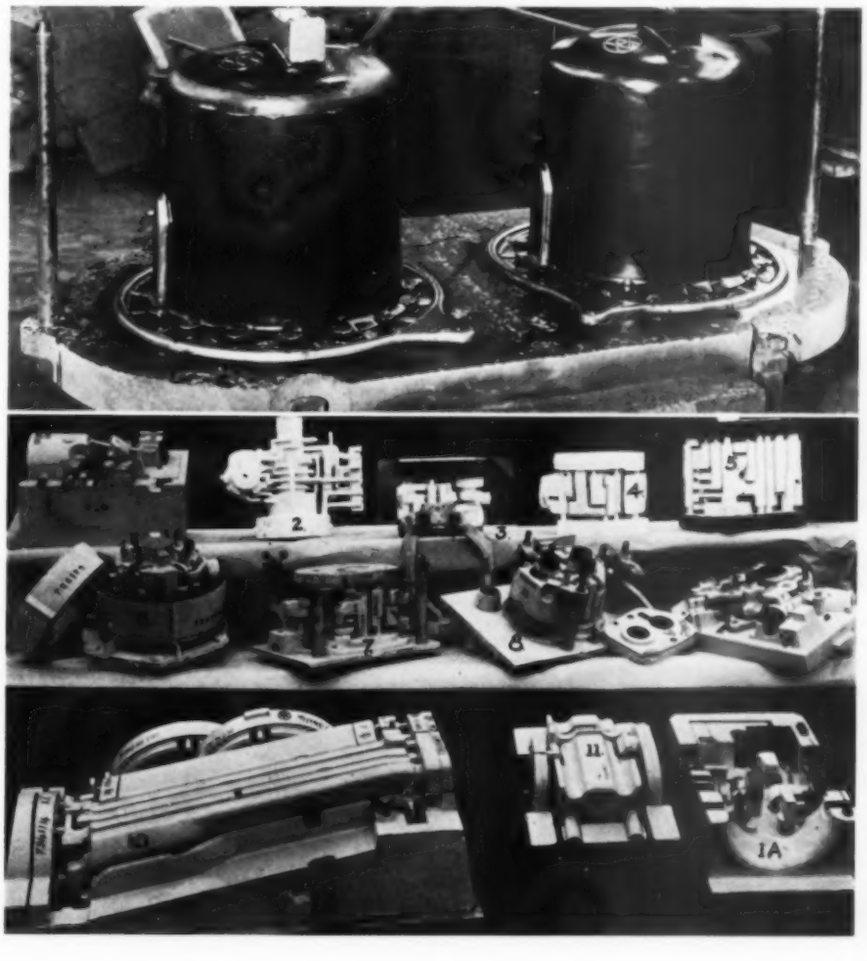
The brass foundry was relocated along the same lines with a battery of molding machines along the columnar line separating the brass from the iron foundry. In other words, the molding machines in the brass foundry and a corresponding number in the gray iron foundry are located back to back under parallel lines of sand hoppers. Molds from the machines are placed on roller conveyor units, where in succession they are stored, poured, cooled and finally shaken out over floor gratings in the gangway. The sand in this section of the foundry is treated in a similar but smaller unit to that where the sand for the iron foundry is prepared. The brass foundry sand preparation unit has a capacity of 15 tons per hour, while the gray iron sand preparation unit has a peak capacity of 90 tons per hour.

Melting schedules in the brass foundry are planned to have metal pouring continuously all through the day. In that manner a certain number of molds constantly are in position to be shaken out and leave room on the conveyors for additional molds coming from the molding machines. It is claimed that the repertoire of metals poured in this foundry includes 57 different mixtures and ranges all the way from pure copper, lead, tin, zinc and aluminum to simple and elaborate combinations. Metal is melted in a battery of five electric furnaces made by the Detroit Electric Furnace division of the Kuhlman Electric Co., Bay City, Mich.; four coke-fired pit furnaces; two gas-fired, open-flame furnaces and three electric pot-type furnaces.

General arrangement of the brass foundry is shown in Fig. 4, looking toward the south end of the bay. Sand hoppers over the molding machines are shown at the left with the battery of electric furnaces and pit furnaces at the right. Shakeout gratings in the floor may be noted in the wide central gangway between the conveyor lines and the furnaces. Other features include the pyrometric control stations for keeping accurate and automatic record of metal temperatures. Individual hoods over the electric furnaces prevent pollution of the atmosphere by dust, smoke and gas.

The hoods are suspended from a light steel frame and can be moved backward or forward to meet operating conditions of the furnaces. Opening in the upper end of each hood corresponds to a similar opening in a bent pipe through which smoke and gas fumes are exhausted into a main discharge pipe. The unit is one of several installed by the American Air Filter Co., Inc., Louisville, Kentucky. Other units are installed at the shakeout stations in the gray iron foundry. Detailed description of this type wet dust collector has been presented in THE FOUNDRY on

Fig. 6 (Below)—Two reservoir patterns are mounted on the table of a jolting machine. Metal from two vertical sprues enters the bottom of each mold through a number of small flat gates connected to a runner completely encircling the pattern. Figs. 7 and 8 (Below)—Inside and outside of molds are formed in dry sand cores



several occasions. The dust is caught in a water spray, precipitated as thin mud or sludge and removed daily either by hand in small units, or by automatic scraper in larger installations.

Nonferrous virgin and ingot metal in wide variety and immense quantity is stored in a compartment near the end wall of the building. A sufficient amount for each day's operation is issued upon proper order and stored temporarily in the active storage room between the main storage room and the furnaces. Here the charges are made up accurately according to a prearranged schedule to meet the day's operation. Majority of the castings have to meet rigid specifications. Therefore every step in the progress of the metal from the storage to the shipped casting is controlled by skilled technicians who have at their disposal every modern method and equipment for producing high class castings.

The department in which the small cores are made and assembled is a two story structure with a vertical type oven made by the Foundry Equipment Co., Cleveland, in the center. One section of the upper floor is shown in Fig. 3 while a corresponding section of the lower floor is shown in Fig. 2. The exceedingly complicated character of some of the core assemblies is shown in Fig. 7. Setting the reinforcing wires and wax vents in some of the delicate cores involves a high degree of manual skill and dexterity. Several men are employed on this floor, but the majority of the operators are sharp eyed, nimble fingered young girls trained on the job.

By way of a small digression the upper floor is strongly reminiscent of a school room with each girl sitting at an individual desk. In this instance each desk is equipped with a box for holding the sand at one end, and an extension at the other end for holding the core plates. Heat, light, ventilation and comfortable seats furnish ideal working conditions. Men attendants keep the boxes supplied with sand, place the loaded plates in the oven and place empty plates on the stands. Applicants for position in the core room must conform to certain definite standard of height, weight, education, general intelligence, mental and physical condition. The illustration would seem to indicate that attractive appearance is not a detriment. Benches for 30 girls are provided on three sides of a hollow square with the oven in the center.

Baked In Vertical Oven

Cross section of the oven occupies floor space 10 1/3 x 10 1/3 feet and extends to a total height of 50 feet 9 inches above the first floor, or 35 feet 2 inches above the second floor. The oven has a total of 36 carriers on the conveyor, each carrier with three shelves 24 x 90 inches. Of these 36 carriers, 24 always are in the oven enclosure for baking and cooling. The remainder includes those at the first floor level for unloading, empty carriers moving toward the second floor and those at the loading station. While the normal speed cycle allows approximately 2 hours for the baking and cooling zones, the conveyor is equipped with a variable speed transmission so that speed can be changed as desired.

Heat in the oven is supplied by an oil fired recirculating system equipped with full automatic control, and complete safety devices to automatically shut off the system in case of power or fuel failure. In the cooling zone the cores are smoked off and partially cooled and the recovered heat is returned to the heating system. Smoking off the cores within the oven enclosure eliminates smoke and acrid fumes usually present where hot cores are removed from an oven. A central passageway at the loading station between the upward and down-

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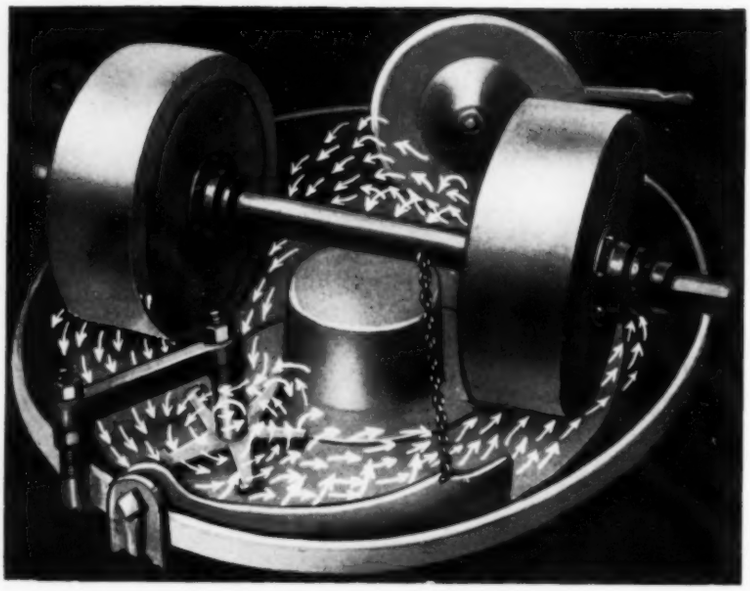

To make an omelet you have to break the eggs. Sand is a foundry necessity but it can't be used to advantage without preparation.

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ward passes of the conveyor permits loading from both sides. Nice adjustment of temperature control is shown where small, intricate cores are baked with others of relatively heavy cross section and weight.

With the exception of certain cores that are returned to the second floor for green sand retopping and a second pass through the oven, all the cores are removed from the shelves as the carriers come into position near the first floor. They are loaded on small rubber tired buggies and distributed to various positions on long benches where they are inspected and in the majority of instances built up into assemblies containing from 3 to 40 units. To insure the required degree of accuracy, the cores are assembled on jigs as shown in Fig. 7. This illustration also shows that in many instances the cores are assembled inside two blocks of core sand which correspond to the usual cope and drag flask.

Covered With a Core

It is interesting to note that the same technique in complete or modified form is employed in the production of large castings either in the floor or in pits in the section of the main bay devoted to this class of miscellaneous castings. In many instances the mold is covered with a core or a number of cores instead of a cope flask. Medium size and large cores are made in a part of the second bay in the vicinity of the pit floors in the main bay. Sand is rammed in coreboxes in the ordinary manner either by hand or with pneumatic rammers.

Cores are loaded on cars and dried in three gas fired ovens 10 x 26 feet. The cars are pulled into and out of the ovens by the crane attached to a cable reeved through a sheave anchored to a dead man in the floor. Molds are dried in a fourth oven 8 x 26 feet, fired and operated in the same manner as the others. Practically all the cores for the brass shop are made in a battery of core blowing machines made by Demmler Bros., Kewanee, Ill.

Barrel cores for the air brake cylinders are green sand swept on cast iron arbors according to a method developed or rather adopted many years ago in the original Westinghouse foundry in Wilmerding, Pa. Equipment and method of making one size are shown in Fig. 5. Prepared sand is available in the hopper at the right. A wood box with a journal bearing at each side receives the molasses-water washed cast iron arbor pierced with a multiplicity of small vent holes. The operator packs sand on the arbor with both hands, then shoves a straight edge into position and shaves the core down to the correct

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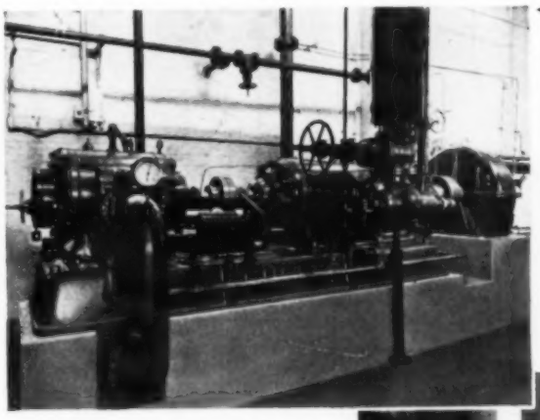
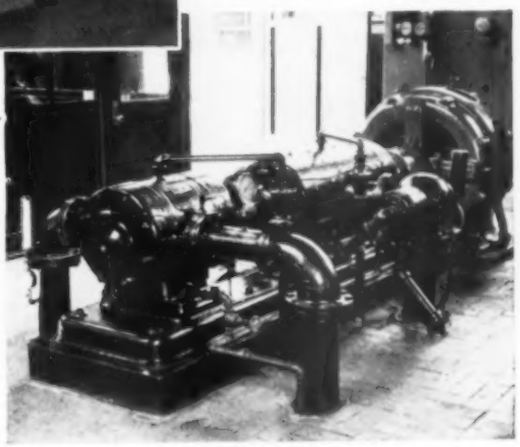


Left: 1775 C.F.M. actual free-air delivery, 100-lb. pressure, Two-stage Rotary Compressor, installed in a plant in New York. This machine has had two comparatively long, 24-hr. per day runs. The first of these runs covered 5,668 hours and the second 12,144 hours, with the exception of less than an hour shut-down for inspection during the latter period. The remainder of the time it has operated approximately 16 hours per day whenever the plant has been in operation.



Right: 685 C.F.M. actual free-air delivery, 100-lb. pressure, Two-stage Rotary Compressor, installed in an eastern steel mill. As soon as this machine was installed it was placed on 24-hour a day service. So satisfactory was the performance of this unit that nine additional Fullers have since been installed.

Write for Bulletin C-3A

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C-48-A

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size and contour. Metal ends on the straight edge come into contact with the machined ends of the arbor.

In this manner a thickness of sand, approximately ¾-inch is swept on the arbor with the surface straight and true and concentric with the machined ends on the arbor. To insure a perfectly smooth face on the inside of the casting the coremaker rubs a coating of plumbago over the surface of the core before removing the core from the stand. Finished cores stand on the floor on end in anticipation of the molder's requirements. One end of the arbor is slightly smaller than the other to facilitate removal from the casting. Sand for the green sand cores has a moisture content of 6 per cent, permeability about 50 and green strength, 6.

The most important feature is the density to which the sand is packed on the barrel. If too hard the metal will not lie against it quietly. If too soft or not rammed uniformly, some of the sand will drop from the barrel, or wash away with the stream of iron. If the sand does not fall off or wash, it will yield to the pressure of the metal with resulting uneven surface and thick areas in the casting. Proper degree of skill can be developed only through actual experience. Naturally some men are more adept than others. Contrary to the belief held in certain quarters, the Aryan race has no monopoly on manual skill and dexterity. The expert coremaker shown in the illustration is a Mexican.

General change and adjustment program suggested the advisability of redesigning certain pieces of pattern equipment, molding, gating and pouring methods on castings in which the scrap loss exceeded the normal. In a number of instances it was found that the introduction of metal through an additional number of gates was all that was necessary to clear up a troublesome situation. In one instance two cast iron gear boxes were cast in a single flask and gated in the simplest manner, that is from a central runner the metal entered the two molds through five small gates along the inner edge of each mold. These castings are thin and many were rejected on account of cold shuts, or hardness on the outer edge. In the new set up the molds are made singly and gated on both sides. Scrap loss has shown a remarkable reduction. A somewhat similar problem was solved in the same manner on end shields for electric motors. No trouble was experienced after the runner was extended to encircle the mold and deliver metal at six equidistant intervals.

The same gating method is employed on pattern equipment for the reservoir castings as in Fig. 6. One pouring basin on top of the cope delivers iron to two sprues, one for each casting. From the sprue the metal flows into a horizontal runner which completely encircles the pattern. Metal enters the mold through a series of small gates and fills the mold uniformly and quickly.

A brief general summing up of the entire project indicates the advantages of applying advanced scientific methods and modern equipment. In the present instance it is claimed floor space has been reduced 45 per cent, production has been increased, working conditions have been improved, sand is prepared mechanically in a manner that permits close control, scrap loss has been reduced to a gratifying extent, and last but probably the most important of all the operating cost sheets show a reduction in the casting cost per pound as compared with the cost under former conditions.

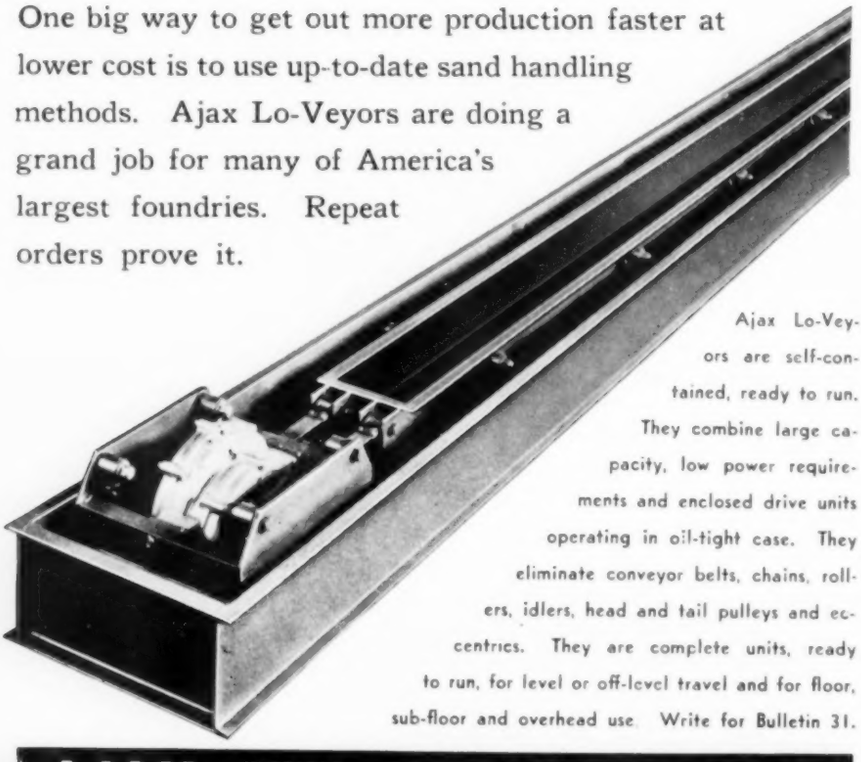
This is the second and concluding article describing some features of the foundry of the Canadian Westinghouse Co. The first article appeared in the June issue.

THE EDITORS.

AJAX LO-VEYORS

Convey

One big way to get out more production faster at lower cost is to use up-to-date sand handling methods. Ajax Lo-Veyors are doing a grand job for many of America's largest foundries. Repeat orders prove it.



Ajax Lo-Veyors are self-contained, ready to run. They combine large capacity, low power requirements and enclosed drive units operating in oil-tight case. They eliminate conveyor belts, chains, rollers, idlers, head and tail pulleys and eccentrics. They are complete units, ready to run, for level or off-level travel and for floor, sub-floor and overhead use. Write for Bulletin 31.

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ADDS TO EMPLOYE'S COMFORT

(*Continued from page* 53)

leave the foundry, re-enter the service building and either proceed into a cafeteria, 75 by 40 feet and seating 196 men at neat tables, equipped with retractible seats, or get our own lunch bucket and eat while seated on benches that line the lounging corridor.

Wholesome food is brought into the service building from the main cafeteria and served efficiently and economically to the men. A complete selection of food is available and an entire meal may be purchased for 26 cents. The room is air-conditioned and approximately 500 meals are served daily, lunch periods being staggered so that all who wish to avail themselves of the cafeteria may be served. It is not necessary that we patronize the cafeteria before availing ourselves of its cool comfort and seating facilities, however. We may sit down there and eat the lunch we have brought with us, perhaps adding a cup of cafeteria coffee to our menu.

Clean Up Before Leaving

Lunchtime ended, we return to the foundry and when quitting time rolls around it is refreshing to return to the locker and shower room for a general cleanup before leaving the plant for the night.

During our trick, should we require first aid, we can obtain it from a nurse in the conveniently located first aid room which opens both on the corridor and on a driveway at the rear of the building. This spotless, white first aid room, presided over by nurses 16 hours a day, has tile and plaster walls, terrazzo floor and up-to-the-minute equipment. Injured persons are given speedy treatment by the nurse. If x-ray or specialist facilities are required the injured one is taken to main first aid quarters of the company. The room is equipped with screens, sterilizer, eye chair, medical cabinets, work tables, cots and stretchers. Should it be necessary to summon an ambulance, the driver is able to back almost into the room by virtue of the rear driveway.

Another door at the rear of the service building opens into a very busy place, the metallurgical laboratory. Here all chemical analyses on samples run in the foundry, as well as sand, coal and coke, core oil and limestone tests are made. The room is air-conditioned and a large hood over the hot plate draws off throat and eye-irritating fumes. A wooden block floor is easy on the feet of laboratory workers who estimate that they make from 100 to 150 chemical analyses daily.

Should we be employed in the office we would push through double doors opening off the lounging corridor and climb a flight of steps to the factory training classroom, a foreman's conference room and a 40 by 90-foot office where employes engaged in all phases of foundry planning and foundry supervision have their quarters. The entire second floor is air-conditioned, has fluorescent lighting and plenty of elbow room.

The foundry and pattern making apprentice class room is a pleasant room where apprentices spend 3 hours each week studying mathematics, mechanical drawing and related subject material in conjunction with their work in the shop. The room accommodates 48 apprentices who work under supervision of two instructors who teach practical as well as academic subjects.

The conference room is equally spacious with an adequate supply of large tables and chairs providing a comfortable setting for all sessions held within its doors. It also provides a place for foremen to make out their employment appraisal reports.

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SPEEDS MACHINE TOOL PRODUCTION

(*Continued from page 56*)

described in the trade press of the period and excited the admiration of foundrymen who gained their information from the printed page, from hearsay and from personal visits.

Rows of steel columns supporting the roof divide the shop into four longitudinal bays extending the full length of the building. The multiplicity of small and medium weight castings required in the finished lathe assemblies are made on a battery of molding machines supplied by the International Molding Machine Co., Chicago, distributed over the first two bays. The third or main bay served by overhead and traveling wall cranes is devoted to the molding, pouring and shakeout of the lathe beds and other large castings. The fourth bay used as a storage space for miscellaneous materials in ordinary and slack periods, is pressed into service and equipped with molding machines in periods of peak production as at present. The cupola room occupies space approximately in the center of the fourth bay with the spouts of the two cupolas projecting into the main bay where the overhead crane handles the ladles.

Core sands and facing sands are prepared on an open mezzanine floor somewhat nearer the east than the west end of the two first bays. Space under the mezzanine floor is occupied by batteries of core ovens; car, rack and shelf types. Large cores are made on the floor to the west of the ovens and loaded on cars. Small cores are made on benches and machines on the east side and loaded for drying on racks and shelves. Among the many advantages claimed for the arrangement is that the core sand mixtures for one department do not become contaminated with the sand mixtures from the second department. More detailed reference to the core department will be given later in the proper place in a description of the sequence of operation involved in the production of castings.

Ahead of Machine Shop

Normally in position to keep a supply of castings slightly ahead of machine shop requirements the foundry, under war time pressure in recent months, has crept ahead and has piled up castings in every available storage space. In one vacant alley beyond the cleaning room a long rack about 15 feet high and designed on the general principle of a pattern storage rack is filled with small miscellaneous castings ready for transportation to the machine shop. Castings for the higher shelves are handled by a lift truck. The group of castings shown in Fig. 6 is typical of the wide miscellany dumped on the floor in the vicinity of the cleaning room after the day's heat has been shaken out. The usual daily heat of 40 tons has been raised to 60 tons and the number of foundry employes from 220 to 330, divided into three shifts.

The Chinese, credited with a high degree of civilization 2000 years before the ancestors of the Aryan race crept out of their caves and took a first bath, have a saying to the effect that a picture is equal to 10,000 words in conveying information. To the reader familiar with foundry practice the illustration Fig. 6 presents information equal to several pages of printed text, on molding methods, gates and risers, use of cores inside and outside, cast iron rods and arbors, and whether the castings were poured in green or dried molds.

Molds for many of the smaller and for all the large castings are dried in a battery of car type ovens with tracks running into the main bay of the foundry. Possibly many of the castings could be produced

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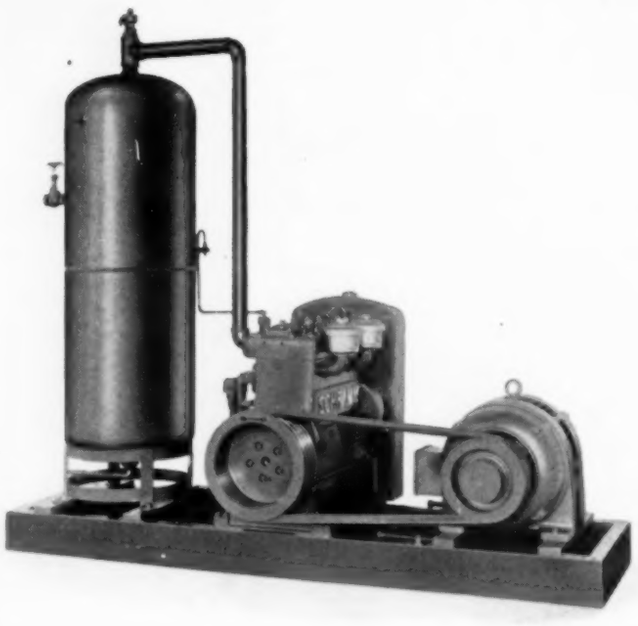

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in green sand molds, but the dry sand mold imparts a smoother skin to the casting and in addition provides insurance against many of the hazards incident to green sand molding practice, particularly hazards connected with excess moisture.

Surface appearance is an important factor in machine tool castings. The dry sand mold practically insures the production of a casting, clean, smooth, accurate in shape and dimensions, free from shrinks, swells, strains and distortion. After they are shaken out the castings are cleaned in a recently installed wash chamber, to be referred to more in detail later, where the cores are removed and all remaining vestiges of sand inside and outside are washed away. The castings then are chipped and the entire surface gone over with small grinding wheels. Then they are passed on to a preparatory finishing department where any minor inequalities in the surface are filled and where the castings are sprayed with a priming coat of gray paint. They then are in condition to go into storage or directly to the machine shop. After the necessary machining and assembling operations the completed machines are coated with a special glossy paint until they shine and glisten smooth and clean as the inside of a sea shell, an enameled bath tub, or the upper lid on a grand piano. Positive works of art and utility.

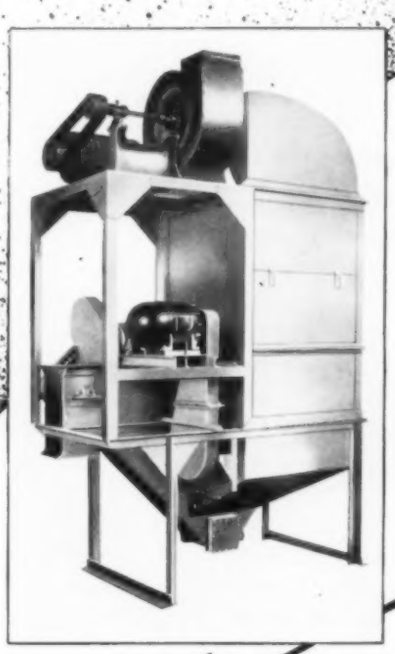
Has Many Advantages

The dry sand mold resists erosion from the flowing metal and consequent formation of gobs of drossy material which with the perversity of inanimate objects float a certain distance and then anchor themselves at a point where they remain concealed until the casting is partly or almost completely machined. The dry mold facilitates the flow of iron to all parts of the mold and lends itself more readily than green sand to the temperature changes while the metal is passing from the liquid to the solid state and later while contraction is taking place as the casting passes from high to atmospheric temperature. Obviously shrinkage and contraction proceed more uniformly in a dried mold filled with dried cores, than in a mold where the inside is formed with dried cores and the outside is green sand which cools or chills the metal rapidly.

Considered from an economic standpoint it is claimed the many advantages of the dried mold, clean surface on the castings, clean solid metal throughout, absence of strains incident to unequal cooling, accuracy of shape and dimensions, reduction in cleaning time and labor, more than offset the comparatively slight cost involved in drying the molds.

A cope flask is not employed on several molds made in this foundry. Instead a flat slab core is employed. The core is reinforced with a cast iron arbor. The cores vary in thickness from 4 to 8 inches, depending on the area and are provided on the top side with suitable hooks for handling. The core is tapered on the outside edges and is lowered into a print in the top of a drag mold, formed by a suitable tapered print on the pattern. Runner and riser cores are placed in position over corresponding openings in the flat core. The mold is ready for casting after suitable bars, straps or rails are clamped over the top.

Loose rods are employed to some extent, but practically all the larger cores are reinforced with cast iron arbors. In many instances the arbors are retrieved intact from the cleaned castings and used repeatedly. Even where they are broken deliberately or by accident they are replaced at slight cost and the iron is incorporated in the cupola charge. On a leveled sand bed the corebox is pressed to leave an outline of the shape. A depression the size and shape of the desired arbor is formed in the sand with either a gate cutter or a suitable piece of wood pressed into the sand. Another piece of



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wood pointed at one end and gradually tapered is employed if necessary to form prongs or dabbers on the branches.

In some instances the arbor is designed to be lifted by an exposed area on one or more arms. In other instances steel loops are placed at the necessary points and become imbedded in the cast metal. No claim is made that the idea is new or original, but experienced foundrymen agree that a good, stiff cast iron arbor is a time and labor saver, and usually preferable to the miscellaneous collection of loose rods comparable to a crow's nest incorporated in many cores.

Straight rods for reinforcing the cores where necessary in nearly all instances are cast iron instead of steel. They are formed in cast iron molds provided with trunnions at the ends and mounted on suitable stands at a convenient pouring height above the floor. Tapered grooves about 3 feet in length and 1 inch wide at the top receive the metal. The mold is grooved on both sides. When one side is filled the mold is turned upside down and the rods fall out. Then the grooves on the opposite side are filled and the operation is repeated. One advantage of this type of reinforcing rod is that on the core room floor it may be broken to any desired length with a hammer. The rods cost practically nothing to make and where they are broken in removal from the casting they have a scrap value as they are made a part of the cupola charge.

Cast iron chaplets are used extensively especially in the lathe beds heavily reinforced with ribs on the inside. Thin cast iron spool chaplets support the cores on the bottom. Others prevent the cores from rising when the mold is filled with metal. Chaplets also are placed between the cores and the sides of the mold, and between the cores which form the ribs. Castings are designed to show as nearly as possible uniform thickness of metal. Chaplets hold the cores rigidly in position to achieve this result. They do not fuse with the surrounding metal, but they are gripped tightly and intimately and are scarcely noticeable when the casting is cleaned. Certainly they are not visible after the casting receives the coating of priming paint.

Split chaplet patterns in various sizes are mounted on pattern plates and the molds are made on a machine on one of the side floors. The castings are cleaned thoroughly in a tumbling barrel and kept in a clean, dry condition until needed. With a fresh supply made and used every day the chaplets have practically no opportunity to lie around and get rusty.

Develops Iron Flask

Among the many innovations introduced by Arnold Salg, veteran foundry superintendent during the 12 years of his incumbency is the type of iron flask shown in several of the accompanying illustrations. At first glance they show no features different from the usual type cast iron flask common to many foundries engaged in the production of medium weight and heavy castings. A closer examination will reveal that the corners are rounded instead of square. In his early days Arnold found some of the larger flasks cracked at the corners after being in use for some time. A cracked flask can be repaired with a bent piece of boiler plate and a few bolts or rivets, but it is an eye sore to the competent foundryman who takes a true craftman's pride in his shop and equipment. New flasks were made with rounded corners inside and outside. Flanges also were rounded at the corners and not one of these flasks has cracked up to the present.

This is the first of two articles covering methods and equipment in the foundry of the Gisholt Machine Co., Madison, Wis. The second article will appear in an early future issue of THE FOUNDRY.

THE EDITORS

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CORE OVENS
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GATING CASTINGS IS IMPORTANT

(*Continued from page* 59)

make pouring a purely mechanical operation would be a means of insuring a more effective value of a skim gate when used. Use of a proper restrictive gate which will control the flow of the metal so that anybody can pour the casting providing the sprue is kept full of metal and maintain pouring condition standard in the mold will result in an improved condition that will help to make good castings more regularly.

Any restriction that will serve as a proper controlling valve to accomplish that purpose must be designed so that it offers just enough resistance to flow to produce the proper control without pouring the casting too slowly to fill it before the metal becomes too cold. To prevent any trouble arising from an insufficient supply of metal reaching the mold due to over restriction it sometimes becomes advantageous to use two or more gates each of them having its own restriction to control the flow.

Employ Several Sprues

In instances where large quantities of metal are demanded it is frequently much the best practice to use several sprues which are connected to one large basin at the top of the mold. Each sprue leads to its own gating system with its own gate restriction designed so as to give a flow divided equally among the several sprues and gate series.

Many molders have felt that they were accomplishing wonders in the making of good castings by providing long zig-zag runners from the sprue to the gates into the casting. While there is a tendency for such a long crooked gate to quiet down the flow of metal it can be accomplished much more accurately by the use of a definitely planned and predetermined sized restriction in the runner.

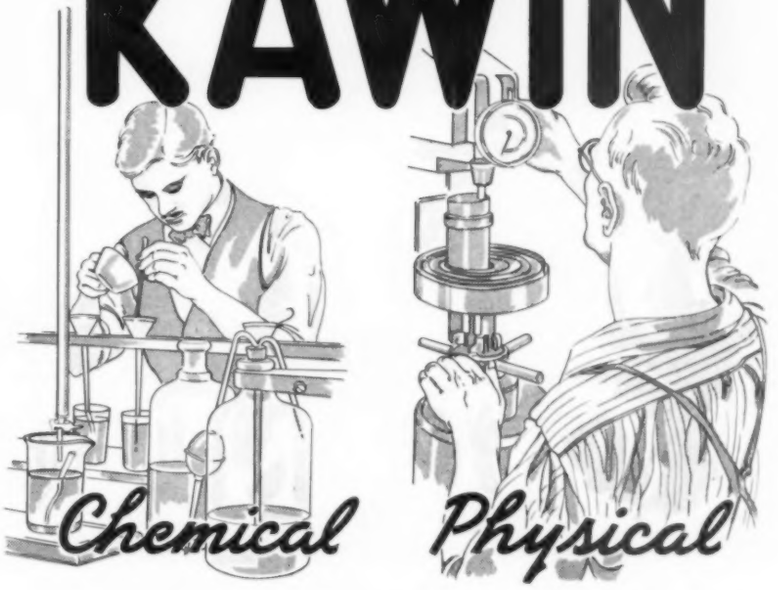
It is the objective of all foundrymen to adopt uniform gates, runners, sprues and other mold conditions for the assurance of a uniform product particularly when a large quantity of castings from a given pattern are to be produced. There is nothing so important as the maintenance of a uniform flow and the study of this important subject will yield substantial dividends in the reduction of defective castings. We believe that this detail is frequently neglected particularly in those found. ries that feel that the molds must be poured by the molder who made the castings or by a molder who is supposed to be a little more expert in the method of pouring castings than would be the case were the pouring done by a pouring gang made up of semi-skilled laborers.

We believe that a proper adoption of a scientifically planned and designed restrictions in the runner will enable the foundryman to turn over to the pouring gang the problem of pouring all molds and relieve the molder. That will make it possible for him to have more hours in which to produce molds and consequently the number of castings produced per day will be increased.

Some skim gates call for dry sand cores or in some instances the gates are entirely made in dry sand cores. Care should be taken in the production of skim cores since the molten metal may tend to destroy the bonding power of the bond and loosen some of the core sand which will be carried with the stream into the mold. We recommend that such cores be made of coarse sand mixtures which will not burn down into loose sand as readily as are cores used in the mold itself.

Such cores also should be protected from abrasion or erosion by the proper coating with some type of refractory material that will retard any tendency to break down

KAWIN



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until after the pouring operation has ceased. A little more attention should be paid to erosion or abrasion resistance where the restriction is provided in the runner than there is on the rest of the runners and gates. No one will deny that real care is necessary to make good clean runners and gates that will be well slicked and free from loose sand or sharp corners that may result in loose sand when the metal flows through or over them.

The very fact that the restriction is going to retard the flow of metal means an additional effect to prevent mold erosion. Therefore, every precaution dictated by good practice for the production of slick, clean, free-flowing gates and runners is doubly important when applied to the restrictions under discussion, skim gates, or other like provisions in the gating system.

The horn gate in Fig. 46 may act as a restriction when it is reversed as shown, but it is better to put a restriction in the line as illustrated because the small end of the horn gate may vary in size for many obvious reasons. A properly designed restriction may be located correctly and may be established scientifically for the proper control of the amount of flow. It may be maintained as uniformly as desired so that it becomes a standardization of the flow of metal for all molds of like design. The amplification of this idea and the provision of the right sized restriction at the right point obviously will be recognized as a means of increasing the uniformity of mold design and of castings resulting in a consequent reduction in defects.

Essential elements that constitute a proper restriction in the gate are, first, the reduction of the cross-sectional area of the gate to the desired size to insure the carrying capacity that is most desirable for the proper pouring of the mold. In other words, since this restriction is going to be the valve to control the amount of metal entering the mold in a given period of time the valve must be open or closed to the right point to insure exactly the right amount of flow.

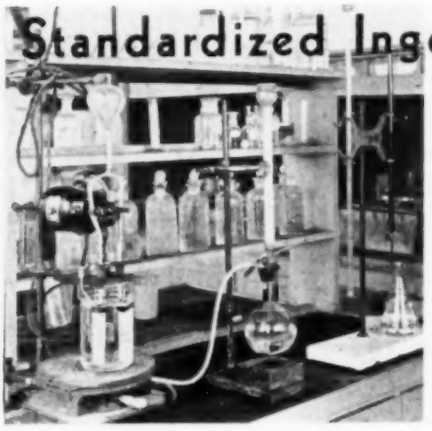
If the valve is too wide open then the flow becomes too rapid and there may be agitation, erosion or other destruction effects within the mold cavity that may cause trouble. If the valve is closed too much so that metal only trickles into the gate system, possibly only one of several gates may be flowing and when the metal begins to chill in that gate another one begins to flow.

Small Gates Condensed

When the two cold streams meet in the casting there may be a cold shut where these streams meet. Again, the stream may be of insufficient volume to fill the mold fast enough to give sharp corners and run the casting in the complete detail desired or if the valve is closed too much the whole system may freeze and a casting only partly filled will result. This, of course, is the extreme of insufficient opening of the valve.

The second essential in the design of the restriction is to avoid sharp changes in dimension. In Fig. 44 a restriction is illustrated in plan, it being assumed that the bottom and top are equally distant from one another all the way along in the gating system. At *A* the restriction starts; at *B* we have the final reduction in section of the gate which controls the amount of metal that can flow in a given period at the pressure developed by the downpour through the sprue and at *C* the normal size gate.

The change in dimension from *A* to *B* should be gradual but may be more abrupt than that from *B* to *C*. The change in dimension from B to *C* should be gradual so as to avoid nozzle effect that will cause the metal to spray into the following gate and thus cool itself sometimes to the point where solid metal is formed in the form of shots that must be



Standardized Ingot Specifications

Why Our Industry is Equal to the "All Out" Effort

Ten years after the last war, there were in use some six hundred common alloys of brass and bronze.

Ten years later there were only one-sixth as many. *Now 23 alloys represent 80% of the tonnage produced.*

In this progressive[1] scientific simplification of nonferrous foundry practice, we see the key reason why the industry is said to be equal to the "all out" effort and demand.

The trend to standard specifications continues. A glance at your Manual of the Nonferrous Ingot Metal Institute will corroborate this. Use this manual more often in your efforts to develop maximum casting efficiency and economy.

15 STANDARD ALLOYS BY AJAX

Ajax Tombasil
Ajax Plastic Bronze
Ajax Anti-Acid Bronze
Ajax Phosphor Bronze
Ajax Red Brass Ingots
Ajax Manganese Bronze
Ajax High-Tensile Manganese Bronze
Ajax Golden Glow Yellow Brass
Ajax Nickel-Copper 50-50%
Ajax Manganese Copper
Ajax Aluminum Alloys
Ajax Phosphor Copper
Ajax Silicon Copper
Ajax Nickel Alloys
Ajax Phosphor Tin

[1] The first program for scientific control of ingot metal production was set up in and by the Ajax Metal Company, 44 years ago. Investigate Ajax Standard Alloys.

THE AJAX METAL COMPANY
ESTABLISHED 1880 PHILADELPHIA

ASSOCIATE COMPANIES: AJAX ELECTRIC FURNACE CORPORATION, *Ajax-Wyatt Induction Furnaces for Melting*
AJAX ELECTROTHERMIC CORPORATION, *Ajax-Northrup Induction Furnaces for Melting, Heating*
AJAX ELECTRIC COMPANY, INC., *Electric Salt Bath Furnaces*

redissolved in the oncoming fluid metal.

It makes little difference as to shape of the gate cross-section provided it is not shaped so that undue radiating area results. To cool the metal in the gating system is always bad practice. Of course some cooling does take place but it should be at a minimum so that the temperature of the metal entering the mold may be maintained as uniformly as possible in comparing one mold with another when poured from the same pot of metal.

To sum up, a restriction in the gating system may be used to provide a uniform flow of metal into the mold regardless of the way the metal is poured into the sprue. Such a restriction may or may not be made in dry sand cores to be rammed into the mold as part of the gating system.

Such a restriction can be definitely laid down by a little experimenting so that the flow of metal into the gating system and thence into the mold will be such that agitation will be reduced to a minimum and yet a sufficient flow of metal will be provided to insure the filling of the mold under ideal conditions. Such a restriction also avoids the necessity for long irregular snake-like shaped gates. It only remains for the foundryman to determine the right size, valve opening or the correct size of restriction for each casting or set of castings to insure an absolutely uniform condition in every set of molds set down for pouring.

Where two or more sprues lead to the same or separate gating series there should be a restriction for each sprue to hold back the flow of metal in the sprue to a point where the sprue will be kept full during the entire pouring period and to insure the scientific control of flow to a point where uniformity of practice is insured.

This is the ninth of a series of articles on gating nonferrous castings. Other articles appeared in the November and December, 1940, and in the January, February, March, April, May and June issues.

THE EDITORS.

"Protecting Plant Manpower—Practical Points on Industrial Sanitation and Hygiene" is the title of a new publication just issued by the Division of Labor Standards as special bulletin No. 3. It contains practical information on such industrial hygiene subjects as fatigue; criteria of industrial health hazards; preventive measures; heating, ventilation, and cooling of work places; personal service conveniences; illumination; and noise. The elements of an industrial health program for the small plant are outlined. Single copies of the publication may be obtained without charge from the Division of Labor Standards, Washington.

Conserve Pig Iron In Canada

According to newspaper accounts recently published Canadian Federal Steel Controller H. D. Scully ordered Canadian pig iron producers on June 9 to cancel all orders on their books, and establish a list of priorities designed to conserve iron and steel for essential war industries. Orders will be given approval on a preferential basis as follows: Castings required for war work; castings required by transportation systems, mining and petroleum industries and public utilities; castings required for agricultural implements and the pulp, paper and lumber industries, and castings not otherwise classified.

On May 10 approximately 3600 employes of the Manhattan Rubber Mfg. division, Raybestos-Manhattan Inc., Passaic, N. J., were present at the unveiling of a memorial to Col. Arthur Farragut Townsend, one of the founders of the firm, and who served as president and chairman of the board for 37 years. The memorial was made possible through contributions of the employes.

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SAND BLASTING

● You buy new blast rooms for bigger and better production through better ventilation, better illumination. . . . These advantages and others which are definitely outstanding in Parsons Blast Rooms are fully described in this new bulletin. Write or wire for it today.

40 ft. long Grit Blast Room cleaning steel castings for a large motor manufacturer.

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THE NAME PLATE THAT MEANS QUALITY
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PARSONS ENGINEERING CORPORATION CLEVELAND

FUNDAMENTAL ASPECTS OF FOUNDRY SAND

(*Continued from page* 61)

American Foundrymen's Association, 1926.

Buchanan *Foundry Trade Journal*, 1937, has pointed out that the degree of compression may be measured as the *dry weight* of the specimen, or the *dry apparent density*. He defines this term as the weight in grams per milliliter of the dried test piece. *Green apparent density* is defined by the same author as the weight in grams milliliter of the green test piece. A third term, the true density, is defined as the ratio of weight of dry sand to the weight of the same volume of water at a given temperature. These terms will be used in this study.

The sloping curves of Fig. 2 show the relationship of moisture content and green apparent density of both round and angular sands. The dry apparent density was determined by subtracting the moisture from the green specimens, and this relationship is expressed as the horizontal lines.

The density of a rammed sand specimen is largely controlled by the frictional resistance between the grains. The degree of frictional resistance may be traced to the following factors: 1. Size of the grains. 2. Shape of the grains. 3. Surface condition of the grain. 4. Distribution of the grains. 5. Water content.

Density increases with increasing grain size. That may be explained by the decreasing number of contact points per unit volume which gives less frictional resistance. The shape of the grain simultaneously may influence the results, since many investigators have pointed out that the larger the grain size of any sand, the more round the grain. It is obvious from this figure that the round grain sand has higher density. Angular grains give not only more contact points, but also contact areas and wedge effect.

It was noted from the beginning of the tests that the surface condition of the sand grain was an important factor. Beginning with a new sand it was not possible to duplicate results from two sets of tests made on the same batch of sand. The original tests made on a sand showed considerably lower density values. However, the third and fourth sets of tests on a given sand showed fairly good agreement. The curves obtained on the original tests were of the same shape as subsequent sets of tests, but the values for the latter were shifted upward on the ordinate axis. This may be due to (1) the original roughness of the sand grains, (2) coating from minerals in the water used, and (3) fines worn off the grains.

Compare Sand Samples

Fines and coating were eliminated by resieving the sand and washing it in acid (hydrofluoric and nitric) and in sodium hydroxide solution. It was impossible to duplicate results originally obtained on the sand. The original sand therefore may have surfaces more or less rough and pitted. The mixing undoubtedly subjected the grains to a polishing operation which decreased the roughness of the grain. It was not possible to observe this surface change of microscopic examination.

Angular sand showed a greater difference in results, with repeated use in testing, than the round grains. The sharp corners of the angular sand are more subject to wear than the surfaces of the round sand grains.

Surface condition of the sand grains have a marked influence on the results obtained in this type of an investigation. It is impossible to obtain reliable results by taking a new sand mix, mixing it, and testing

Actual Story of a Nonferrous Foundry

■ This installation will be of interest to many nonferrous foundrymen. Delta Star Electric Company of Chicago had a problem on their hands . . . production requirements necessitated the addition of new furnaces to an already overcrowded melting room, short on both floor space and headroom.

As shown, the handling problem was solved by a specially designed ½-ton travelling hand crane with auxiliary cantilever beam and unit for hoisting the crucibles. Note that each furnace may be readily serviced independently of the others.

The ventilation problem was taken care of by serving each furnace with specially-built telescoping hoods, each counter-balanced.

Send Us Your Sketch

Would you be interested in knowing how your furnace room might be served in a similar manner? We'll be glad to tell you if you will send us a drawing of your furnace floor layout, overhead clearance, number of furnaces, distance of crane travel. The above system may be duplicated at reasonable cost and good delivery promised.

CHICAGO TRAMRAIL COMPANY

2910 CARROLL AVE. Phone KEDzie 7475 CHICAGO, ILL.

it at increasing moisture contents, because the surface conditions of the sand grain change continually during the test. The sand must previously be mixed and worked to approach stability before tests can be duplicated. Round sand grains appear to attain the stabilized state in a shorter mixing time than angular grains. This behavior of sand brings out the most pronounced shortcoming of the A. F. A. method of test preparation, namely, the inability to duplicate specimens of one and the same sand.

The influence of grain distribution is also clearly shown by Fig. 2. A mixture of two-thirds 40-mesh and one-third 100-mesh Ottawa round grain gives a much higher density than the natural (unsieved) Ottawa sand itself. The unsieved sand has a fairly good grain distribution, and the synthetic mixture a very poor distribution. The 100-mesh material, having a diameter of less than 0.0083 inch and greater than 0.0059-inch, fills or fits in the interstices of the 40-mesh material, thereby adding weight without an appreciable increase in specimen volume, as pointed out by Sheehan, *Foundry Trade Journal*, 1939.

Table I

Sieve Analysis

Retained on Screen Number	Ottawa Sand (Round Grain) Per Cent	Ohio Crushed Silica Sand (Angular Grain) Per Cent
20	. .	0.72
30	0.40	6.40
40	44.10	39.60
50	38.26	33.20
70	14.68	16.92
100	2.46	2.14
140	0.80	0.36
200	. . . .	0.20
	100.70	99.54

This is the first of two articles discussing some fundamental phases of foundry sands. The second article will appear in an early issue.

THE EDITORS.

Book Review

Arsenal of Democracy, by Burnham Finney, 284 pages, published by the McGraw-Hill Book Co. Inc., New York, for $2.50.

Because of his intimate knowledge of the metal working industry, and especially the manufacture and use of machine tools, the author, who is editor of *The American Machinist*, has been able to present an excellent picture of what has transpired in the first eight months of the national defense program.

The author has pointed out our lack of the facilities for manufacturing the machines of war, and how industry has been tooled up to perform an enormous production job. The Industrial Mobilization Plan of the war department is discussed and attention is given to "bottlenecks." The author then considers the problems developed by the industrial expansion program in building and paying for new plants, training men and management, and in providing the essential raw materials.

This book should be read by that portion of the public impatient with results thus far obtained since it presents a vivid picture of progress made in the face of difficulties.

Recently published booklet, No. 125 in the production series prepared by the American Management Association, 330 West Forty-second street, New York, deals with the subject, "Company Problems of Multiple-Shift Operation." Contributors are as follows: Alan C. Curtiss, assistant to president and general manager, Scovill Mfg. Co.; Henry V. Oberg, company industrial engineer, Armstrong Cork Co.; C. R. Hockmuth, assistant works manager, Kearney & Trecker Corp.; H. W. Johnstone, vice president in charge of operations Merck & Co., Inc.

Lion Binder is a core paste, a core binder and a facing sand binder.

As a paste it grips the seam with the strength of a weld, making the joint the strongest part of the core. It will not swell, will not draw moisture and has very little gas.

As a core or facing sand binder, it gives high dry strength to the sand.

Booklet on Lion Binder sent free on request.

J. S. McCORMICK CO., PITTSBURGH, PA.

FOUNDRY FACINGS • SUPPLIES • EQUIPMENT

FOUNDRY ACTIVITIES

SANDERS CO., Elizabeth City, N. C., organized by Brad, Bradford and Clarence Sanders, has purchased property, equipment, machinery and goods of the Mill and Marine Supply and Iron Works divisions of the Elizabeth City Iron Works & Supply Co., Elizabeth City, N. C. The Elizabeth City Iron Works company still is operating its shipyard division.

* * *

National Bronze & Aluminum Foundry Co., 8810 Laisy avenue, Cleveland, is building its fifth extension in recent months, to enlarge foundry and machine shop facilities. The two-story addition will be 20 x 151 feet.

* * *

Ampco Metal Inc., Milwaukee, is constructing a 60,000 square foot foundry addition.

* * *

A new foundry building will be erected at the National Iron Works, San Diego, Calif.

* * *

Mueller Brass Co., Port Huron, Mich., is building a one-story foundry addition costing $50,000.

* * *

Keating & Sons Co., Montreal, Que., will build a $30,000 addition to its steel plant and foundry.

* * *

Birdsboro Steel Foundry & Machine Co., Birdsboro, Pa., is building a foundry 82 x 300 and 60 x 200 feet to cost about $100,000.

* * *

Southern Forge & Foundry Co. Inc., Memphis, Tenn., has been organized with $100,000 capital to manufacture gray iron castings, with plans to make steel castings

Ready to Go-ANYTIME!
Over a period of 50 years' personal and business acquaintanceship with the foundry industry, the mechanics of our service facilities have been tuned to a high degree of efficiency.
These years of experience in the distribution of Ferro Alloys, Pig Iron, Coal and Coke and the convenient locations of our nine offices enable our staff of trained men to make helpful suggestions and to give your business their personal attention.
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CLEVELAND · PHILADELPHIA · PITTSBURGH · INDIANAPOLIS

RAW MATERIAL PRICES
June 16, 1941

Iron	
No. 2 foundry, Valley	$24 to 24.50
No. 2 Southern Birmingham	20.00
No. 2 foundry, Chicago	24.00
No. 2 foundry, Buffalo	24.00
Basic, Buffalo	23.00
Basic, Valley	$23.50 to 24.00
Malleable, Chicago	24.00
Malleable, Buffalo	24.50
Charcoal iron, furnace	28.00
Coke	
Connellsville beehive premium	$7.25 to $7.60
Wise county beehive coke	5.50 to 6.50
Detroit by-product delivered	12.25
Scrap	
Heavy melting steel, Valley, No. 2	$19.00
Heavy melting steel, Pittsburgh, No. 2	19.00
Heavy melting steel, Chicago, No. 2	17.75
Stove plate, Buffalo	19.00
Stove plate, Chicago	16.00
No. 1 cast, mchy., New York	....
No. 1 cast, mchy., Chicago	21.50
No. 1 cupola, Pittsburgh	21.00
No. 1 cupola, Philadelphia	23.00
No. 1 cast, Birmingham	19.25
Car wheels, iron, Pittsburgh	....
Car wheels, iron, Chicago	....
Railroad malleable, Chicago	....
Malleable, Buffalo	....
Nonferrous Metals	**Cents per pound**
Castings copper, refinery	12.25
Straits tin	52.25
Aluminum, 99 per cent	17.00
Aluminum, No. 12 (Secondary, standard)	16.00
Lead, New York	5.85
Antimony, New York	14.00
Nickel, electro	35.00
Zinc, East St. Louis, Ill	7.25

and forgings later. J. W. Dyess is vice president and general manager.

* * *

Kinney Iron Works, 2525 East Forty-ninth street, Los Angeles, is building an office and shop building to cost $4000.

* * *

Ideal Furnace Co., Milan, Mich., is rebuilding its plant at a cost of $125,000. W. Johnson is president.

* * *

Robert Mitchell Co. Ltd., 750 Belair avenue, Montreal, Que., has let contract for a plant addition to cost $30,000.

* * *

Alhambra Foundry, 1147 Meridian street, Alhambra, Calif., is erecting a new foundry building at a cost of $4500.

* * *

Allis-Chalmers Mfg. Co., West Allis, Wis., is building a plant addition to building No. 7, 145 x 224 feet.

* * *

Banner Iron Works, 4560 Shaw avenue, St. Louis, is rebuilding its core department recently damaged by a gas explosion.

* * *

Acme Pattern & Tool Co., 232 North Findlay street, Dayton, O., will build a one-story foundry 132 x 306 feet to cost about $130,000.

* * *

Eagle Mfg. Co., 3520 Avalon boulevard, Los Angeles, is building a new plant 50 x 126 feet and will cost $6000.

* * *

Canada Iron Foundries Ltd., 227 St. Maurice street, Three Rivers, Que., has let general contract for a plant addition.

* * *

Pacific Foundry Co. Ltd., 3100 Nineteenth street, San Francisco, is building a foundry addition to cost more than $40,000.

* * *

Cheney Foundry, 1517 South Third street, Minneapolis, is building a one-story foundry addition 40 x 70 feet. George W. Cheney is president.

* * *

Finkelstein Foundry & Supply Co., 2323 East Twenty-seventh street, Los Angeles, is building an addition to its plant 28 x 80 feet, and to cost $2000.

* * *

Jamestown Malleable Iron Corp., Tiffany avenue, Jamestown, N. Y., has let general contract for construction of a plant addition to cost about $40,000.

* * *

Sandusky Foundry & Machine Co., Market and Fulton streets, Sandusky, O., is erecting an addition to its plant, 60 x 133 feet, to expand its foundry and machine departments. J. W. Horan is foundry superintendent.

* * *

Atlantic Foundry Co., 182 Beaver street, Akron, O., will build a second extension to its foundry. Like the first, it will be 2500 square feet and will cost $10,000.

* * *

Chapman Valve & Mfg. Co., 203 Hampshire street, Indian Orchard, Mass., is building a one-story foundry addition on Pinevale street, to cost about $45,000.

* * *

Standard Sanitary & Dominion Radiator Ltd., 800 Lansdowne avenue, Toronto, Ont., is building a plant addition to cost about $100,000 with equipment.

* * *

Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., will build a two-story foundry and office building 107 x 286 feet at Trafford City, Pa.

* * *

Milwaukee Malleable & Grey Iron Works, Milwaukee, has let contract for the construction of a one-story plant addition 42 x 141 feet.

* * *

Magnus Metals division, National Lead Co., Milwaukee, is adding a foundry building to its plant. The structure will be one-story

"Yeah! the boss blamed me 'cause we can't get faster service from our suppliers. Seems like the war has slowed everything up—*but he won't take that for an excuse.* He says to buy from a house that was aggressive enough to be ready for this stepped-up demand."

"Yep! the boss says I'm really on my toes. No stop-gap in our production schedule. I ordered chaplets and chills from a house that's *prepared to fill orders at once.* Not only is their service best, but they are sticklers for quality."

ASK FOR OUR CATALOG LISTING

Milwaukee Thread Stem Chaplets
Patented Adjustable Radius Chills
Standard Radius Chills
Other Foundry Supplies

NEW WALL CHART

Here's a new wall chart planned for your convenience. Easy reference with all specifications on chaplets seen at a glance.

**If you haven't received your Milwaukee Chaplet wall Chart, write us today.*

and of irregular shape, 134 x 212 x 278 feet.

* * *

Acme Steel & Malleable Iron Works, Military road, Buffalo, is building a foundry addition to cost more than $40,000. A. Crone is vice president.

* * *

Doran Co., 63 Horton street, Seattle, whose plant recently was damaged by fire, plans two foundry units 68 x 160 feet and 70 x 100 feet, to cost about $20,000.

* * *

R. H. Osbrink Mfg. Co., 1412 East Sixty-second street, Los Angeles, has awarded contract for the construction of an aluminum foundry building 24 x 44 feet to cost $1000.

* * *

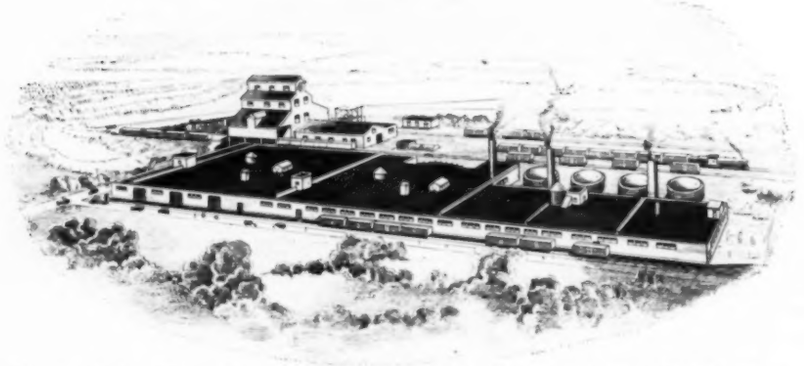
Building permit has been issued to A. O. Smith for construction of a new foundry building at 5715 Lenova street, Los Angeles. The structure will be 40 x 80 feet and will cost $6900.

* * *

Index of foundry equipment orders for May, 1941, according to a recent report of the Foundry Equipment Manufacturers' Association, Cleveland, was 298.7 as compared with 377.2 in April. Index of orders for new equipment was 291.2, and for repairs 321.0. The index of 100 represents the monthly average of reported sales to metal working industries during 1937-38-39.

GOOSE LAKE

Fire Clay and
Fire Clay Flour
Fire Clay Brick
Therm-O-Flake Insulation



Goose Lake Clay Deposit with Clay Grinding and Fire Brick Plant

Illinois Clay Products Company
JOLIET, ILL.

Adventures of Bill

(*Concluded from page* 76)

" 'About a month later he shows up in a new suit. I was all set to crucify him and was just making up my mind whether to peg him head up or head down, when he said something that saved his life and gave me an inspiration. He was now in partnership with another robber like himself and their business was buying and selling skimmings, sweepings and all that kind of stuff from brass shops. I tells him I have a lot of stuff, but it is not ready for shipment. If he comes around next day I'll have it for him.

" 'That afternoon I has one of my lads drag over the fill of about a dozen big barrels of ashes from a dump back of a power house or something about as big as this here Pennsylvania hotel. We filled the barrels and then spread a layer of skimmings about 2 inches deep over the top of the stuff. Rag Time called next day, took up a handful or two and everything was satisfactory. I wanted $4 a barrel and he offered $3. We argued back and forth for about an hour and at last compromised on $3.50. He backed up a truck and hauled the load away.

" 'Next day he was back foaming at the mouth and dancing like one of them there whirling dervishes. Between spasms he called me all the names he could think of and for good measure included my father and mother and all my relations, those that had passed on and who undoubtedly were frying in a lake of brimstone, and those who were to come and meet the same fate.

" 'When he finally paused for breath I told him he had nothing to worry about. All he had to do was to send a letter to his old father in Ireland. The old gent could send him a bag of brass crosses all duly blessed with bell, book and candle. He could bury three or four in each barrel of ashes and thus raise the metallic content to any desired amount.' "

"Do you really believe," I asked Bill, "that your brassy friend could get away with anything like that?"

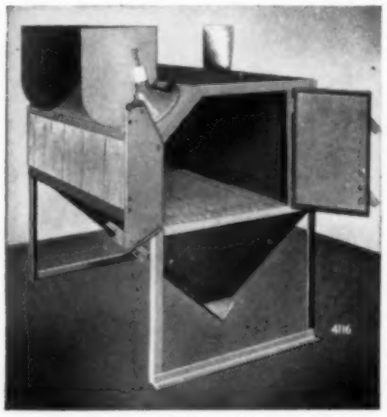
"Could be," he remarked laconically. "How would you like to join our society?"

According to the National Safety Council, Chicago, both the frequency rate and severity rate of industrial injuries have decreased in the foundry industry for 1940 as compared to 1939. Frequency rate decreased about 4 per cent while the severity rate decreased about 24 per cent.

NEW EQUIPMENT and Supplies

Blast Cabinet

The W. W. Sly Mfg. Co., 4753 Train Ave., Cleveland, recently has placed on the market a new and improved design blast cabinet with exceptional lighting facilities. Lights are mounted at the front instead of



the ends of the cabinet to throw the light from the operator and fully on the castings. The operator's view is protected by a hood which shuts off the light at the top and sides and concentrates on the work. As shown in the accompanying illustration, large doors at both ends provide easy access for insertion and removal of castings on the grating. In the cabinet shown, one of a complete line, the cabinet proper is 36 inches deep, 72 inches in length and 30 inches high. The cabinet can be furnished with induction type blast gun attached to the bottom of the cabinet hopper, with positive pressure blast tank below the cabinet, or with bucket elevator and pressure blast tank on floor level.

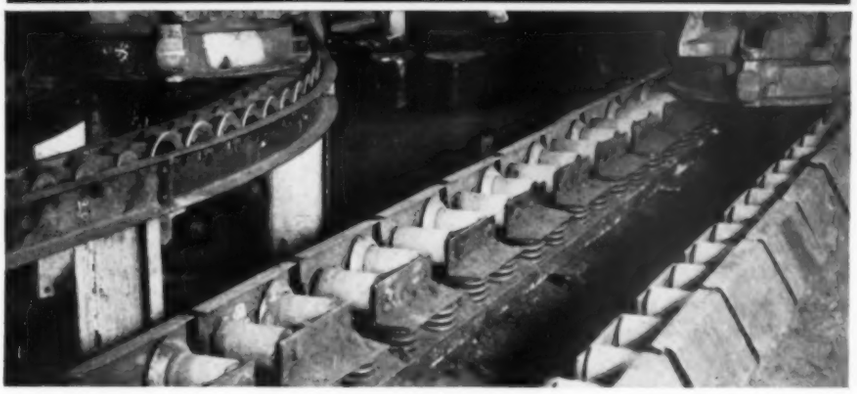
Cylinder Truck

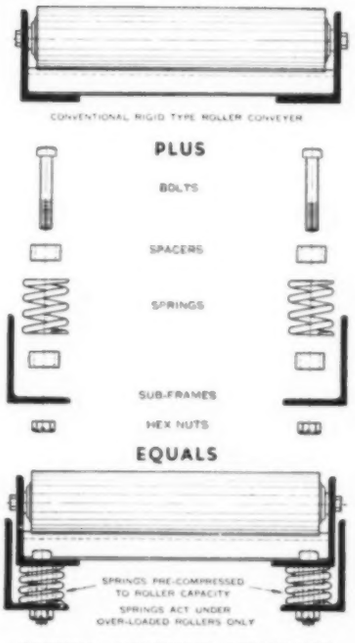
The Linde Air Products Co., New York, has made available a new hand truck designed to carry an oxygen cylinder, an acetylene cylinder and a complete cutting and welding outfit. The new truck is claimed to be light in weight, well balanced and rides on 14-inch wheels equipped with semi-pneumatic rubber tires. The truck is exceptionally easy to maneuver. Over rough places it is claimed it is easier to handle than many trucks with larger wheels. The new design results in a 4½-inch reduction in over all width to negotiate narrow passages. Size of the removable metal tool box for extra blow pipes, tips, goggles and wrenches has been increased.

V-Belt Sheave

Worthington Pump & Machinery Corp., Harrison, N. J., has designed a new type V-belt driver sheave of the quick detachable and quick de-

MATHEWS SPRING MOUNTED CONVEYERS





SPRING MOUNTED CONVEYER

CUT MAINTENANCE COSTS

THE principle is simple; the roller axles are rigidly locked in the frame as in the conventional "rigid type" construction, but the conveyer frame which retains the rollers is carried on pre-compressed coil springs. The springs are held in compression equal to the rated safe load of each roller. Under impact conditions or excessive loads the springs absorb the overload.

This construction represents the greatest improvement in roller conveyer in many years. Its application will reduce maintenance costs by prolonging the life of the equipment. When conditions are severe, "spring mounted" is the practical conveyer construction for the job.

Capacities from 150 lbs. to 8000 lbs. per roller available.

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MATHEWS CONVEYER COMPANY
104 TENTH STREET, ELLWOOD CITY, PENNA.

CONTINUOUS FLOW PRINCIPLE OF HANDLING MATERIALS

INTENSIFIED PRODUCTION

■

New improvements must follow technical development to attain desired objectives. If you are planning to increase production, slash the pay roll and provide better working conditions for the men; "if it is worth doing, it is worth doing well" and, within practical and economical limits, power-driven machinery should displace manual labor.

Foundry operators, wishing to secure the greatest return on capital investment, have found it profitable to retain our engineering services to interpret their present needs and future demands upon existing facilities whether planning plant expansion, modernization or installation of new equipment. You may be favorably disposed to consider mechanical equipment to obtain progressive flow of materials from stock bin to finished product.

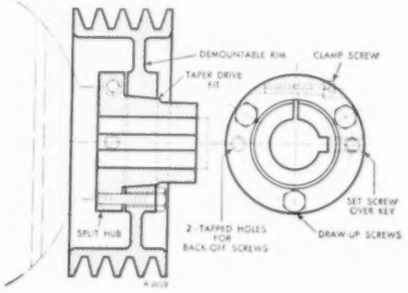
The market offers a large selection of standard machinery which may fulfill your requirement. In buying, sand conditioning systems, continuous mullers, sand delivery belts, power-driven mold conveyors for snap flasks to molds weighing five ton or more, cupola charging machines, continuous molding and pouring systems, new equipment for core rooms and cleaning departments, including exhaust and ventilating systems, refuse disposal and sand reclamation units, etc., each detail must be given careful consideration.

Our services and experience gained during twenty years of uninterrupted practice as foundry engineers are at your disposal in planning new projects, plant expansion or modernization and in carrying same through to a successful conclusion. Clients of national prominence will gladly attest as to our ability to assist you. A. A. Wickland & Co., Foundry Engineers, Engineering Building, Chicago.

A. A. Wickland

—Advt.

mountable type. Extreme simplicity of construction is claimed, also suitability for any application where quick mounting of sheave to shaft

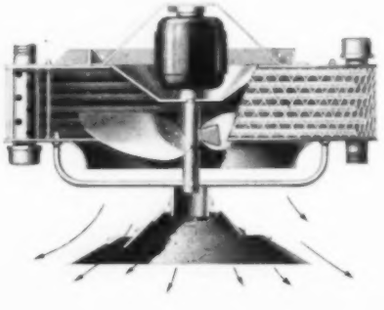


or the reverse process is necessary or desirable. The sheave consists of two parts, a longitudinally split or clamp hub and a V-groove rim. The hub is clamped to the shaft by a cap screw in the flange and by a standard key and key way. The rim is taper fitted to the hub and fastened by three draw bolts. To remove the rim the draw bolts are withdrawn and two are inserted in holes tapped in the rim where the bolts act as jamb screws and bear against the hub to force the rim off the taper without disturbing the position of the hub. No pounding or prying is required to remove either rim or hub. With this equipment it is claimed that the danger of battered motor bearings, bent shafts, broken sheaves and human injury are eliminated.

Unit Heater

B. F. Sturtevant Co., Hyde Park, Boston, recently has developed a down blast speed heater to supplent an extensive line of floor and standard type suspended heaters. The new heater, shown in the accompanying illustration, projects heat directly downward and therefore is particularly suitable for high installations. The largest size is efficient it is claimed at heights up to 40 feet above the floor level. In low installations, deflection cones are left on to provide wider diffusion of the heated air stream.

Heater consists of a circular extended surface heating element protected by a screen guard, with copper tubes brazed into copper headers. Fins are aluminum for maximum heat transfer. The heater is available in 12 sizes with capacities ranging from 40,000 to 400,000 B. t. u. per hour at 2 pounds steam pressure and entering air at 60 degrees Fahr.



Elevating Table

Lyon Iron Works, Greene, N. Y., has developed a new hydraulic elevating table, as shown in the accompanying illustration, and designed for lifting or supporting overhanging work on machines, transferring heavy materials or parts from one location to another, making a convenient, adjustable and portable

work table or bench to bring work to the proper height for operator. Advantages claimed by the maker include: Hydraulic table elevated or lowered by foot pedal; table cannot swivel as related to the base; base is same size as table. Special sizes made to order. Standard specifications include: capacity 2000 pounds; table size 24 x 30 inches; base 24 x 30 inches; minimum height 28 inches; maximum height 42 inches.

Air Valve

C. B. Hunt & Son, 1865 East Pershing street, Salem, O., recently has developed a new double four way hand operated air valve suitable for the control of two individual double acting air cylinders with only one valve. This valve is claimed to have many industrial possibilities on air operated clamps, fixtures, knives or any application where it is necessary to have one point of control for two cylinders that lead and lag each other in their respective actions.

Spray Gun

Binks Mfg. Co., Chicago, has designed a new foundry gun designed especially for spraying molds and cores with blacking or other washes. The gun of the siphon type as shown in the accompanying illustration has no fluid valve incorporated in the construction. It is simple and

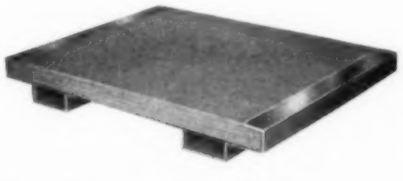
sturdy, built to withstand rough foundry use. The device is available in two models. In the first the spray material comes up the outside tube with the air on the inside nozzle, and is designed for use on large molds and cores. In the second model the material comes through the center with the air flowing through the outside nozzle, to produce a finer atomized spray on small molds or cores. In ordinary practice the spraying material is kept in a steel or wood pail. A ⅜-inch material hose 6 feet in length with one connection will serve satisfactorily.

Cam Limit Switch

Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., has developed a new cam-operated limit switch with contacts arranged to swing open for inspection and maintenance, and which is designed for hoists, industrial trucks, etc. It is available with ratings of 2 amperes at 600 volts direct current, and 25 amperes at 110 volts alternating current. It has two contacts, either or both of which normally may be closed or open. Contacts are mounted on a micarta fingerboard, and the switch is housed in a sheet steel weatherproof case approximately 4½ x 5½ x 6 inches.

Bottom Board

Chicago Mfg. & Distributing Co., 1928 West 46th street, Chicago has developed a bottom board with steel locked cleats for which several advantages are claimed over the ordinary bottom board reinforced with wood cleats. The steel braced board will not twist or warp. The steel cleats are driven over the edges of the board and held in place with wood screws. In the event of a spill or a runout the cleats will not burn. The boards now are available in practically any quantity and in sizes from 10 to 18 inches square.



Lifting Clamp

Never-Slip Safety Clamp Co., New York, has developed a safety lifting clamp shown in the accompanying illustration. It has a replaceable, grooved, hardened steel jaw

liner. Clamps for either horizontal or vertical lifting of steel plates, sheets or sections are available in 10 styles for handling material weighing up to 12 tons and from ⅛ to 6 inches in thickness. The replaceable plate lines the face of the jaw and is said to extend the life of the clamp and contribute to lifting and holding qualities.

Roller Conveyor

Standard Conveyor Co., North St. Paul, Minn., has developed a concave roller conveyor designed specifically for handling shells between machine operations, or any other cylindrical objects up to 6 inches diameter. Rollers are formed from 2½-inch No. 10 gage tubing. The ends are reduced in size and reamed to form a seat for the bearings without any separate hubs or cages. Hexagon shafts serve the double purpose of locking the bearing to the shaft and the shaft in the frame. This prevents turning and undue wear and insures uniformity at the roller carrying surface even after long service.

Rubber Hose

The Manhattan Rubber Mfg., Division, Raybestos-Manhattan, Inc., Passaic, N. J., has introduced a new rubber hose which is claimed to combine balance, homogeneity and flexibility to a high degree. Advantages include extreme flexibility, light weight, ease of handling, insepar-

Maximum
METAL QUALITY—

•

is yours, only if and when you have attained maximum furnace efficiency. This is only possible if the manufacturer of your furnace equipment has been schooled on the scientific application of heat to melting of metal. Fisher Furnaces incorporate this experience, plus design features that assure maximum production at a minimum cost. Fisher's obligation does not cease with the sale—Fisher engineers are competent in Foundry melting equipment layout and co-operate with you to provide complete co-ordination of the equipment to your shop conditions.

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- Oil and gas fired crucible melting furnaces: stationary, hand tilted and motorized nose pour types.
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- Combination blower and oil pumping systems.
- Oil and gas burners.
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Foundry Riddle

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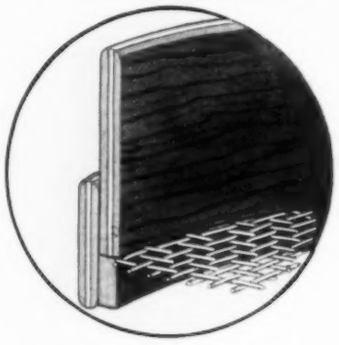
An *exclusive* feature. Many times stronger than materials usually found in foundry riddles. One BIG reason why "Tri-Ply" riddles last longer.

SPLIT-PROOF CONSTRUCTION
3-ply frame material cannot split and "run" with the grain. Another reason why "Tri-Ply" riddles will give added months of useful service.

NO CROSS WIRES
Special construction, shown below, makes cross wires unnecessary. This feature adds materially to screen life through elimination of extra abrasion.

LONGER LIFE
They not only look better ("Tri-Ply" riddles are all mahogany stained), but they last longer because of many exclusive, patented construction features.

TRI-PLY SPECIAL CONSTRUCTION



Made in all meshes and three sizes—16" 18" 20" diameter

Stocked by leading foundry supply houses

SEYMOUR & PECK CO.
P. O. Box 5609 Chicago, Illinois

TRI-PLY RIDDLES
COST NO MORE

able covers and plies, uniform diameters and reduced elongation and expansion. The hose is manufactured in 50-foot lengths on accurate steel mandrels in several types that cover a wide variety of applications: Air hose, water hose, high pressure orchard spray hose, mine spraying hose, air-oil and oil spray hose and steam pressing iron hose.

Flood Light

Birdseye Lamp Sales Division, Wabash Appliance Corp., Brooklyn, N. Y. announces a new flood light designed for general lighting purposes. It is claimed the lamp delivers a concentrated flood of light in a medium beam that is especially effective in applications requiring intense illumination. Inside of the lamp bulb is lined with silver to produce a reflecting surface that cannot be tarnished by dust or fumes. For localized lighting to supplement general illumination, a detachable swivel socket focuses the light exactly where it is needed. The flood light short bulb is made in four sizes and four voltages, from 100 to 300 watts and 110 to 125 volts.

Lift Truck

Yale & Towne Mfg. Co., 4530 Tacony street, Philadelphia, has introduced a stream lined model of the former hand lift truck capable of handling loads up to 2500 pounds. A new type balanced tubular handle with comfortable hand grip, tubular shaft and lower handle casting in a single unit is said to prevent parts from working loose. Hand balancing mechanism is designed to keep handle in upright position.

The self-locking lift hook requires only slight pressure on the treadle to engage the lifting frame. When the load is lifted fully the hook disengages automatically to prevent what is known as the flying handle. Loads may be elevated with the handle at any point within a 90 degree arc. With a full 180 degree steer the truck may be manipulated around sharp turns. The new steering column operates inside a special steel bushing. The new truck retains the compound articulated lifting mechanism that changes the lifting ratio, flattens out the lift curve and reduces lifting effort.

Fan Type Heater

Herman Nelson Corp., Moline, Ill., recently has developed a vertical shaft propeller fan type heater to discharge heated air in a vertical downward direction. The fan, shown in the accompanying illustration, projects air through the heating element with sufficient velocity to direct the heated air to the working level. One model for high ceiling is available in three outlet arrangements. The first will project a

single column of air straight down. The second projects two columns of air at angles of 30 degrees to vertical. The third arrangement projects the air at 30 degrees to vertical in all directions. Adjustment is provided to vary the outlet velocity 25 per cent from maximum.

The second type has been designed with low outlet velocities for applications where it is not necessary to suspend the heaters at great distance from the floor. This model has two arrangements. One provides a louver which directs half the air in one direction and the other half in the opposite direction. The first model for 12 to 18-foot ceilings is available in six sizes providing from 43,000 to 193,000 B.t.u. with air deliveries from 545 to 2620 cubic feet per minute. The second model for ceilings between 18 and 45 feet has capacity ranging from 98,000 to

500,000 B.t.u. with air deliveries from 1330 to 7050 cubic feet per minute.

Safety Goggle

American Optical Co., Southbridge, Mass., has developed a new on-center safety goggle of the spectacle type for which many features are claimed: A double braced bridge developed for hard usage; design that conforms to the orbit of the eye; comfortable rocking

pads; insulated, heat resisting, perspiration proof temples; three eye and bridge sizes for maximum comfort and efficiency; added protection of special shatter proof lenses. The goggle can be obtained with wire mesh shields which give extra protection against particles striking from the sides. The screens are noncorrosive and are cleaned easily.

Sprue Cutters

Foundry division, Scully-Jones & Co., 1901 South Rockwell street, Chicago, now is manufacturing and marketing various sizes of sprue cutters which formerly were made by the Tessmer Machine & Tool Co., Detroit. The sprue cutters are the same size as previously supplied

namely, model H with a capacity of ¾-inch, and model I with a capacity of 1¼ inches. The machine shown in the accompanying illustration is the larger size.

Seals Pores

Durez Plastics & Chemicals, Inc., North Tonawanda, N. Y., announces a special phenolic resin for application to castings that show leakage under pressure. The resin is forced under air pressure into the porous areas of the casting. Small castings may be treated in a suitable pressure tank. Larger castings may be sealed and the resin pumped directly into them. Pressures vary from 45 to 100 pounds per square inch. Castings must be baked to thoroughly set or polymerize the resin. Small castings may be baked in an oven for several hours at a temperature between 250 and 275 degrees Fahr.; or preferably in the pressure tank by applying steam for 2 hours at 20 pounds pressure, followed by 2 hours at 100 pounds pressure. Baking under pressure will produce a cleaner, smoother surface. Large castings may be baked by applying steam direct at the same pressures. The special resin hardened in this way is claimed to be practically impervious to water, solvents, mild alkalies and acids.

Fire Brick

Johns-Manville, 22 East 40th street, New York, is marketing a new line of insulating fire brick for the temperature range from 1600 to 2600 degrees Fahr. and designed for direct exposure in a wide variety of furnaces, ovens and other heated equipment, except where subject to slag action or mechanical abuse. Bricks are furnished according to four temperature limits. The first for exposed service to 1600 degrees Fahr. and for backup service to 2000 degrees. Second, third and fourth for exposed or backup service at temperatures of 2000, 2300 and 2600 degrees Fahr. respectively. The new line supplements the company's regular series of backup insulating brick for temperatures of 1600, 2000 and 2500 degrees Fahr. The new insulating fire bricks are produced from a plastic refractory clay and an organic filler. The filler is burned out during the manufacturing process, and is said to give a uniform, controlled pore structure to each of the various types and imparts the characteristics of light weight, strength and high insulating value.

Eagle Grinding Wheel Co., 2519 West Fulton street, Chicago, is constructing an addition to its factory which will expand capacity.

BETTER CASTINGS mean

Fewer REJECTS
Greater TIME ECONOMY
Higher PROFIT FACTOR

For Gun Metal and Bronzes, use "FOSECO" R6

Simple, effective method for producing sound castings in all types of Tin Bronzes.

- Eliminates gases
- Produces sound castings
- Reduces sulphur & other impurities
- Increases physical properties
- Castings have clean surface

For Aluminum Alloys, cover with "FOSECO" COVERAL

Protects aluminum during your melting operation. Less metal skimmed, gives greater yield of metal at *casting price.*

- Stops oxidation
- Cleans oxides, dirt, etc. from metal
- Increases fluidity
- Creates no fumes
- Not hygroscopic—no accidents
- Saves metal
- Inexpensive to use

"FOSECO" Products for

GUN METAL; TIN BRONZES; COMPOSITION MIXTURES; PHOSPHOR BRONZE; YELLOW BRASS; CONDUCTIVITY COPPER.

ALUMINUM BRONZE; MANGANESE BRONZE; SILICON BRONZE.

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ALUMINUM REMOVER; *removes aluminum contamination.*

ALUMINUM ALLOYS— *Sand or Die.*

GREY IRON and MALLEABLE.

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NO METAL Shortage !

TAMA-STONE
"The Perfect Pattern Compound"

Tamastone Pattern Compound makes it possible to convert loose and metal gated patterns into match plate production. Defense orders can be speeded up 400% or more—at exceedingly low cost!

Check the following time savers

TAMMS NEW LIQUID PARTING

Actual foundry production prove this superior product speeds production! For quick use, spray on pattern—dry with air hose! Keeps sand from adhering to pattern. Tamms Liquid Parting will not "build-up" on pattern—gives exact detail every time. Many report full day runs without recoating!

METALINE—To be applied over wax fillets or Modeling wax build-ups. Forms Metallic coating that will not soften when Tamms Liquid Parting is applied. Also prevents warm sand from adhering to waxed places on patterns.

PLASTIC METAL FILLER

New plastic compound made for filling deep gouges and rough places on metal patterns. Put damaged or uneven patterns in perfect working condition quickly and easily.

Write for SAMPLES!

Foundry Division
TAMMS SILICA CO.
228 N. La Salle St., Chicago, Ill.

Obituary

CLARENCE M. HENDERSON, 66, one of the best known foundrymen on the Pacific Coast, died recently at his home. Mr. Henderson was president and general manager, H. C. Macauley Iron Foundry Co., Berkeley, Calif., and served as the first president of the Northern California Chapter, A.F.A., and was a member of the National Association of Manufacturers.

* * *

Edwin A. Bateman, 62, junior partner, Bauer, Wilson & Bateman, Chicago, pig iron and coke merchants, died in that city June 4.

* * *

Arthur W. Berresford, 68, former vice president and general manager, Cutler-Hammer Inc., Milwaukee, died in New York recently.

* * *

James T. Clark Jr., 64, president, James T. Clark Co., Newark, N. J., a firm established by his father in 1870, died May 22 in that city.

* * *

Frank L. Stevens, 76, president, Noble & Wood Machine Co., Hoosick Falls, N. Y., died May 19 at his home in that city.

* * *

Michael L. Schultz, 61, former superintendent and consulting engineer, The Dole Valve Co., Chicago, died at his home in that city, June 5, after a long illness.

* * *

Lawrence W. Scudder, 54, president, Century Metalcraft Corp., Chicago, and an officer and director of other industrial concerns in that city, died at his home in Lake Forest, Ill., May 18.

* * *

Fred W. Behling, 68, president, Kagel Brass Foundry Co., Milwaukee, died Feb. 11 at his home in that city. Mr. Behling was in the brass foundry business approximately 20 years, and had been president of that company about 10 years.

* * *

Samuel K. Dennis, 82, an inventor and superintendent of experiments, International Harvester Co., Chicago, until his retirement 15 years ago, died in that city June 2. Mr. Dennis had been employed by the Harvester company 38 years.

* * *

William J. H. Striegel, 75, former metallurgist and later partner in the Russ Mfg. Co., now a division of the Bastian-Blessing Co., died recently at his home in Lakewood, O. Mr. Striegel was born in Buffalo and joined the Russ company in 1898. He was foundry superintendent for many years and later was elected a member of the board of directors. He retired from active duty in 1929 but retained his directorship in the Bastian-Blessing Co.

* * *

Warren G. Jones, 50, president, W. A. Jones Foundry & Machine Co., Chicago, died of a heart attack at his home in River Forest, Ill., June 5. He had been associated with the foundry since 1910 and president since 1925.

* * *

Irwin A. McIntyre, 55, one of the founders of the Milwaukee Steel Foundry Co., Milwaukee, died May 22 in that city. Mr. McIntyre was purchasing agent and assistant to the general manager of International Harvester Co. for some time and served as director and secretary of the Milwaukee Steel Foundry Co. until 1932.

* * *

E. E. Birkland, 57, engineer of maintenance, Crane Co., Chicago, died at his home in that city recently. Mr. Birkland was born in Sweden and was graduated from Falun, Sweden in mechanical engineering. The following year he came to the United States and settled in Chicago. He was connected with the engineering department, Western Electric Co., Chicago, for 2 years and then joined the Crane Co., Chicago, first as draftsman, then as chief draftsman, and later as engineer of maintenance, the position he held until his death. Mr. Birkland was active in the work of the industrial hygiene codes committee of the American Foundrymen's Association, and also was a member of the Swedish Engineers Society of Chicago.

* * *

Dudley B. Bullard, 72, vice president, Bullard Co., Bridgeport, Conn., died June 10 at his home in Southport, Conn. Mr. Bullard was born in Bristol, Conn., July 13, 1869, and was graduated from Williston Academy in 1891. He gained his early engineering experience as an apprentice in the plant of his father, who was the founder of the Bridgeport Machine Tool Works, later known as Bullard Machine Tool Co., and in January, 1929, Bullard Co. After serving as an apprentice in the machine shop he was advanced to the drafting room, subsequently becoming superintendent, chief engineer, and vice president in charge of engineering. Mr. Bullard was an organizer of the Bridgeport chapter, American Society of Mechanical Engineers, and served as its chairman, 1931-32.

Federal Foundry Supply Co., 4600 East Seventy-first street, Cleveland, is adding to its office and production space by a machine shop addition 60 x 140 feet and office addition 38 x 66 feet, both two stories. Louis H. Heyl is vice president.